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Applying fuzzy delphi and best-worst method for identifying and prioritizing key factors affecting on university-industry collaboration

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A B S T R A C T

The collaboration between the universities and industries is currently in the focus of attention globally. Governments, universities, and industries are interested in good and effective collaboration, which would be beneficial for all parties. To foster University-Industry Collaboration, and to help transfer the knowledge and technology between these two parties, academics, politicians and companies are paying attention to science and technology policies more than ever. In this study, the factors affecting the improvement of University-Industry Collaboration are identified and prioritized. In the first step, 20 factors are identified and 12 factors are selected using the Fuzzy Delphi method. Then, using the BWM method, prioritizing the extracted factors is determined for industry sponsorship of the university research. Finally, based on the results, the discussion is conducted and six major strategies are presented to improve this relationship.

1. Introduction

The cooperation between universities and businesses is presently within the focus of attention globally. Governments, universities, and businesses have an interest in smart and effective collaboration, which might be useful for all parties. To foster university-industry cooperation, and therefore the data and technology transfer between these 2 parties, academics, politicians and corporations have been cooperating to promote their relationships. For coming up with and evaluating the policies, it is vital to outline and use correct indicators. Though many governments and agencies are regularly looking for ways to facilitate the interactions between businesses and universities, hoping that they would increase the productive processes. They also look for correct indicators to build university-industry collaboration to form political selections at the national level (Seppo & Lilles, 2014). In addition, universities and corporations will use these indicators in evaluating the collaboration results. Governments square measure actively promote the formation and development of U-I networking by coming up with and implementing innovation policies consequently (Perkmann et al., 2013; Etzkowitz et al., 2000; Park & Leydesdorff, 2010; Giuliani & Arza, 2009; Tuunainen & Knuuttila, 2009; Charles, 2003). Nevertheless, our understanding of the underlying mechanisms of U-I interaction remains restricted (Steinmo & adventurer, 2016; Villani et al., 2016).

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Without adequate complementary data concerning business and marketplace, university researchers could also be unable to acknowledge or exploit the opportunities in their technological discoveries (Franklin et al., 2001; Rasmussen & Borch, 2010; Venkataraman, 1997; Vohora et al., 2004). Within the context of developing countries, university researchers' access to industrial data could also be even crucial, as universities typically have to be compelled to undertake additional development or problem-solving work on the far side science lab innovations because of the poor sponge like capacities of exploitation partner companies (Eun et al., 2006). There are several methods for transferring technology or data from university to business (U-I), which is tutorial entrepreneurs' learning from business, i.e. data transfer from business to college (I-U), is an imperative issue. The reverse data flows (IU) also are a rife modality as tutorial entrepreneurs learn from business practitioners to get new ideas with higher potential to be commercialized (Baba et al., 2009; D'Este & Patel, 2007; Siegel et al., 2003). According to Gardner et al. (2010), the data transfer activities have to demonstrate the profit to society from advances in knowledge, to make sure comfortable returns on investment, to produce benchmarks for comparison across the business, to push competition within the world marketplace, and to support future appeals for funding. The businesses have an interest within the returns on investment, which is additionally vital to think about the case of university-industry cooperation activities. The data transfer between universities and business is conducted through varied channels and practices. Therefore, in analyzing and evaluating the cooperation between academe and business, it is necessary to think about the range of connections.

In general University-industry (U-I) collaboration is thought of a relevant economic driver as universities specialize data which are expected to contribute to the economic development of nations or regions. Data and technology transfer between universities and businesses are anticipated to spur innovation, as this sort of collaboration combines not solely heterogeneous collaborates, but heterogeneous the data. Because of the lack of uniformity, partners at the same time face the necessity to cross-different boundaries whereby, managing their boundaries is that the central challenge for inter-organizational collaboration (Tsasis, 2009). In general, University-industry (U-I) collaboration is nowadays considered as a relevant economic driver as universities specialized knowledge that is expected to contribute to the economic development of countries or regions. Knowledge and technology transfer between academia and industry is expected to spur innovation, as this kind of collaboration combines not only heterogeneous collaborates, but also more importantly, heterogeneous knowledge. Due to this heterogeneity, partners concurrently face the need to cross-different boundaries whereby, managing their boundaries is the central challenge for inter-organizational collaboration (Tsasis, 2009). Therefore, the boundary spanning and relevant social processes may open important aspects of U-I collaboration.

In Iran, cooperation between industry and the university has always been poor and has not provided a suitable platform, both for the university and for the industry. Implementation of this cooperation has always experienced some fundamental obstacles. Therefore, the present study is accomplished to identify and prioritize the affective factors for the improvement of cooperation between industry and university. Accordingly, the purpose of the research is to first find the most important factors in the subject literature and research background and then the prioritization of improvement indicators is performed using Fuzzy Delphi and BWM. The reason for using these two models in the research is due to its high measurability and reliability compared with other approaches.

This paper attempts to achieve the goal mentioned above in two parts. In the first section of the study, critical factors for identifying the effective indicators in cooperation between industry and university at the University of Tehran one level are searched through the literature review tool and the background of the research. In the second part of the study, these indicators are screened and localized with a fuzzy Delphi model and then evaluated and prioritized using the BWM technique.

2. University- Industry collaboration

Since their foundation, the role of universities in society has modified over time. At first, the universities were aside from society and their role was to preserve the culture and data for the society (Brockliss, 2000; Etzkowitz et al., 2001). Over time, the interaction with establishments outside universities has augmented significantly. The linkages between universities and enterprises have modified to forms and within the intensity of interaction. The oldest mission of university was to provide some teaching to supply ball-hawking and skilled specialists for society. Within the nineteenth century, the universities began to focus on analysis (Brockliss, 2000). The analysis produces and disseminates some results through publications. According to Etzkowitz (2001) the colleges of these days need to notice the acceptable balance between teaching, basic and applied analysis, and entrepreneurship.

Santoro (2000) and Santoro, Chakrabarti (2002) distinguish four forms of university-industry relationships:

- Research support, that embodies monetary and instrumentation contributions created to universities by trade. These contributions may be unrestricted gifts of endowment trust funds that the university uses to upgrade laboratories, offer fellowships to students, or offer capital for promising new outcomes. Nowadays, the support for university analysis is additional targeted and infrequently tied to specific analysis outcomes, which, in return, offer data and new technologies to trade .
- Cooperative analysis includes contract analysis with individual investigators, consulting by faculty, and bound cluster arrangements specifically for addressing immediate trade issues. Within the case of individual investigators or a practice there is typically just one academician concerned named World Health Organization which is functioning with one firm on a targeted scientific research.
- Knowledge transfer encompasses extremely interactive activities that embody on-going formal and informal personal interactions, cooperative education, program development, and personnel exchanges.
- Technology transfer additionally involves extremely interactive activities. Compared to data transfer the main focus here is on addressing immediate and additional specific trade problems. In technology transfer, the university-driven analysis and trade experience create complementary contributions into commercial technologies required by market. Typically, the university provides basic and technical data at the side of technology patent of licensing services. Trade members offer data in an exceedingly specific applied space at the side of a transparent downside statement associated with market demand. Technology transfer takes place through technological consulting arrangements, the firm's use of university's extension services, collectively in hand or operated ventures .

Collaboration between business practitioners and tutorial researchers has been conceptualized as a higher-level method that encompasses cooperation and coordination (Bedwell et al., 2012). U-I collaboration has been characterized by "cultural divide" between partners in terms of goals, views, motives and routines; so, such collaboration is very many-sided. The decision-making processes is normally difficult (Bäck & Kohtamäki, 2015), and individual factors have an effect on it. Amabile et al. (2001) attributed 3 necessary options for the collaboration between tutorial researchers and business practitioners: 1) it involves those that area unit members of various professions (academia and business); 2) it's a collaboration between people or groups, not between organizations; and 3) the collaborators are not all members of a similar organization. The excellence of people and groups versus organizations may be relevant purpose of departure during this study, because the abstract approach focuses on people and groups. Organizations produce the context for the collaboration, whereas motivation and maturity for that depends rather on the particular characteristics of acting people and groups than on the overall organizational processes.

During the past few years, analysis has been conducted on collaboration between trade and therefore the university :

Research has shown that there are a unit bound characteristics of a corporation that influence its ability to utilize outwardly generated knowledge domain, and therefore the data are transferred from universities (Agrawal 2001). The amount of assimilatory capability depends on previous connected data and knowledge (Cohen & Levinthal, 1990). Barnes et al. (2002) outlined in their analysis the complementary experience or strengths, history as collaboration partners within the past, shared vision or strategic importance, complementary aims, and cooperative expertise usually as necessary firm characteristics, that area unit sensible stipulation for thriving cooperation. The standard of workers may be thought-about as firm capabilities. The matter here is that it is exhausting to have it objectively. The indications of firm capability may be, as an example, quality certificates (ISO certificates), variety of previous comes with universities, membership in some analysis cluster or cooperative network, variety of scientists, education of workers, and therefore the involvement of workers within the activities of university (e.g. guest lecturers in university).

According to Perkmann et al. (2011) Patent applications or patents granted may be used as measures of the technological output of university–industry outcomes. Also, some university–industry alliances area unit supported specific 'open science' rules that stipulate that each one data generated ought to flow into the general public domain with no restrictions.

The number of publications in peer-reviewed journals is employed in academic as a serious performance metric. The amount of joint publications of university and trade scientists may be a terribly specific indicators of university-industry collaboration (Langford et al., 2006). Tijssen et al. (2009) used joint analysis publications that area unit co-produced by R&D workers from non-public sector organizations and universities for evaluating university-industry analysis cooperation. The joint analysis publications are specialized in longer-term views whereas applied analysis in a short- or medium-term development focus on area unit typically not disseminated within the peer-reviewed literature. Patents or alternative type, which frequently are also confidential. The co-authored publications area unit thought-about to be an honest indicator of diffusion of information and skills, and informal network between universities and firms. The indicator is additionally quantitative, available, and straightforward to gather. However, it is necessary to know that this indicator should not be used alone for outlining university-industry cooperation as there are unit several cases wherever no co-authored papers area unit revealed (Lundberg 2006).

Perkmann et al. (2011) believe that intensity of the collaboration is associated with the coaching and learning opportunities between universities and businesses. From analysis, it seems that there are completely different methods for creating functions (Iqbal et al. 2011). Workshops, seminars and conferences, wherever the participants are from each university and trade, may be thought-about because the outputs of university-industry cooperation. The high variety of non-public contacts additionally indicates the next intensity of collaboration and data transfer between the partners.

Previous studies in the field of collaboration between university and industry identified several factors, Table 1 shows a summary of the factors mentioned in the previous studies.

Table 1
Indicators university-industry cooperation

Index	INDICATORS UNIVERSITY-INDUSTRY COOPERATION
C1	R&D expenditure
C2	university's governmental income
C3	non-government donations
C4	industry sponsorship of university research
C5	scholarships number of researchers
C6	number of publications
C7	projects
C8	reports or patents done in the past

Table 1
Indicators university-industry cooperation (Continued)

Index	INDICATORS UNIVERSITY-INDUSTRY COOPERATION
C9	number of industry contracts in the university
C10	number of strategies concerning industry-university cooperation in the university
C11	amount of resources dedicated to support cooperation in university
C12	perception of researcher about the benefits from the cooperation with industry
C13	quality certificates (ISO)
C14	previous collaboration with academia
C15	membership of some association or research group
C16	number of scientists
C17	structure of employees by occupation and education
C18	number of previous contracts with universities
C19	involvement with university (e.g. alumni, lecturer)
C20	perception of the firm about the benefits from the cooperation with university

Source: compiled by authors based on Barnes et al. (2002), Bercovitz and Feldman (2008), Perkmann et al. (2011), Langford et al. (2006), Iqbal et al. (2011), Tijssen et al. (2009), Luoma et al. (2011).

3. Methodology

The present research is in terms of purpose, fundamental- practical method and in terms of method of data and information, collection is descriptive-survey. The present research was conducted in the first step using the Fuzzy Delphi method and based on opinions of 38 experts. The method of best worst method was conducted. This section explains this Steps.

3.1. Fuzzy Delphi Method

Kaufmann and Gupta were the primary to introduce Fuzzy Delphi Method (FDM) in 1988. The method has been applied quite frequently with success in numerous applications such as; business web site content personal presentation (Kardaras et al., 2013), dry bulk freight predictions (Duru et al., 2012), constructing road safety performance indicators (Ma et al., 2011), etc. Usually, the analysis involves unsure and general datasets, wherever the expert's opinions are usually subjective. Thus, the triangular fuzzy numbers (TFNs) are acceptable to utilize compared with the crisp numbers within the sense that it will represent the knowledge more precisely in real state of affairs. The strategy truly may be a generalization of classical methodology referred to as the urban center method that was developed by Dalkey and Helmer (1963). However, during this paper, we have a tendency to modify the FDM with following extra tools/instruments:

i) Provide the decision matrix to suit with the nature of the datasets,

ii) Utilize the TFNs to evaluate the importance of each attribute,

iii) Equip the decision analysis with 3 levels of confidence using linguistic variables (i.e., Very Optimistic (VO), Neutral (N), and Very Pessimistic (VP)) (see sub-section 3.3)

To evaluate each attribute, in this study, we utilized 7 linguistic variables to represent the level of importance given in Table 2.

Table 2
The seven linguistic variables

Linguistic variables	TFNs
Very low (VL)	(0, 0.1, 0.2)
Low (L)	(0.1, 0.2, 0.3)
Medium low (ML)	(0.2, 0.3, 0.4)
Medlum (M)	(0.3, 0.4, 0.7)
Medium high (MH)	(0.6, 0.7, 0.8)
High (H)	(0.7, 0.8, 0.9)
Very high (VH)	(0.8, 0.9, 1.0)

3.2. Levels of Confidence based on Linguistic Variables

In this study the alpha (α)-cuts methodology was used for the analysis to discover the influence of the choice variations of the results. The α-cut defines the amount of confidence forecast that ends up in the distinction in call results. Thus, we've made the linguistic variables to represent the 3 distinctions assured things as Table 3.

Table 3
Linguistic expressions of three levels of confidence

Linguistic variables	TFNs derived from (a_1, a_2, a_3)
Very optimistic (VO)	(a_1, (a_2+3a_3)/4,a_3)
Neutral (N)	(a_1, a_2, a_3)
Very pessimistic (VP)	(a_1, (a_2+3a_1)/4,a_3)

To measure the three completely different levels of confidence, we have a tendency to utilize them by some expressions. Then, the three levels of confidence are projected to include with linguistic variables. The score matrix at α-level ($\widetilde{CL}_\alpha$) is given as:

$$(\widetilde{CL}_\alpha) = [\tilde{a}_{ij}]_\alpha \tag{1}$$

where $\tilde{a}_{ij}|_\alpha$ is the triangular fuzzy number derived from $\tilde{a}_{ij}^r$ under three different linguistic variables, respectively (i.e., $\mathrm{VO} \approx \alpha = 0.80, \mathrm{N} \approx \alpha = 0.50$ and $\mathrm{VP} \approx \alpha = 0.20$) by Eq. (1). Then, the defuzzification process (Chen, 1996) was performed to derive the crisp values using Eq. (2) given us

$$\delta/_x = \frac{1}{4}[(a_1 + 2a_2 + a_3)], \tag{2}$$

Next, from crisp values on top, we will rank them in descending order to spot the preferences of every various. Obviously, we will write like $A_1 \approx A_2 > \cdots, > A_n$ where both symbols '≈' and '>' mean 'is equal to' and 'superior to', respectively.

Thus, the summary of the step-by-step proposed methodology is depicted in Fig. 1.

S1: Categorize the identified datasets and construct the decision matrix to evaluate each criterion and sub-criterion based on experts' perspective

S2: Calculate fuzzy average which represents consensus adjustment and re-examine for verification (if necessary)

S3: Defuzzify an average fuzzy set $\delta / x = \frac{1}{4}[a_1 + 2a_2 + a_3]$

S4: Measure the confidence levels of results using linguistic variables (i.e. *VO, N, VP*)

S5: Rank them in descending order

Fig. 1. The step-by-step methodology

3.3. Best-Worst Method

Best worst methodology is the latest multi-criteria deciding methodology introduced by Rezaei (2015). The premise of this method is to weigh the factors by pairwise comparison like analytic hierarchy method (AHP) and analytic network method (ANP) strategies (Saaty, 2004). BWM has two obvious benefits compared with AHP and ANP methods: initial, less pairwise comparison and second higher consistency magnitude relation. In BWM, by determinative preference of the simplest criterion over different criteria and preference of all criteria on worst criterion by assignment a scale between one and nine, the weights of criteria are fixed. The steps of the BWM are as follows (Rzaei, 2015; Rezaei, 2016):

1. Determine a set of criteria as $\{c_1, c_2, \ldots, c_n\}$
2. Determine the best and the worst criterion by an expert or an experts team
3. Determine the preference vector of best criterion over all criteria by using numbers between 1 and 9 as: $A_B = (a_{B1}, a_{B2}, \ldots, a_{Bn})$. Note that $a_{BB} = 1$.
4. Determine the preference vector of all criteria over worst criterion by using numbers between 1 and 9 as: $A_W = (a_{1W}, a_{2W}, \ldots, a_{3W})^T$. Note that $a_{WW} = 1$.
5. Find the optimal weights $(w_1^*, w_2^*, \ldots, w_n^*)$

If the preferences are a_{Bi} and a_{iW}, the goal is to find the optimal weights which minimize the absolute maximum difference of the $\left|{}^{w_B}/_{w_i} - a_{Bi}\right|$ and $\left|{}^{w_i}/_{w_W} - a_{iW}\right|$. By assuming sum of weights equal to one and non-negativity constraints, Rezaei (2016) introduced the linear BWM as follows:

$$\begin{aligned}
&\min \xi \\
&\text{subject to} \\
&|w_i - a_{iW} w_W| \le \xi \quad i = 1 \ldots, n \\
&|w_B - a_{Bi} w_i| \le \xi, \qquad i = 1, \ldots, n \\
&\sum_{i=1}^{n} w_i = 1 \\
&w_i \ge 0, \qquad j = 1, \ldots, n
\end{aligned} \tag{3}$$

In this paper, linear BWM given in Eqs. (3) is applied to estimate the criteria weights. In the last stage, it is needed to calculate the consistency ratio. Consistency ratio is employed to check how consistent a pairwise reference comparison is. There is full consistency in pairwise comparison vector while $a_{Bj} \times a_{jW} = a_{BW}$. In case which $a_{Bj} \times a_{jW} \neq a_{BW}$, inconsistency occurs. In order to calculate consistency ratio using ξ , the corresponding consistency index is considered as follows:

$$\text{Consistency Ratio} = \frac{\xi}{\text{Consistency Index}} \tag{4}$$

Consistency values for different a_{BW} values are presented in a table. For more details readers can refer to Rezaei (2015).

4. Results

4.1. Fuzzy Delphi

In this stage, the FDM is applied to select the most important practices from the ones listed in the previous stage. The output of FDM is presented in Table 4.

Table 4
Outputs of fuzzy Delphi method

N	practices	l	m	u	Defuzzified	Decision
1	R&D expenditure	0.5	0.908	1	0.636	accept
2	university's governmental income	0.25	0.721	1	0.657	accept
3	non-government donations	0.25	0.75	1	0.666	accept
4	membership of some association or research group	0.25	0.721	1	0.657	accept
5	scholarships number of researchers	0.5	0.908	1	0.802	accept
6	number of publications	0	0.314	0.5	0.271	reject
7	number of industry contracts at the university	0.25	0.629	1	0.626	reject
8	reports or patents done in the past	0	0.825	1	0.608	reject
9	projects	0.5	0.908	1	0.802	accept
10	number of strategies concerning industry-university cooperation at the university	0	0360	0.75	0.370	reject
11	number of previous contracts with universities	0.25	0.572	0.75	0.524	reject
12	perception of researcher about the benefits from the cooperation with industry	0.25	0.721	1	0657	accept
13	perception of the firm about the benefits from the cooperation with university	0.5	0.825	1	0.775	accept
14	previous collaboration with academia	0	0.572	1	0.524	reject
15	industry sponsorship of university research	0.25	0.655	1	0.635	accept
16	number of scientists	0	0.360	0.75	0.370	reject
17	structure of employees by occupation and education	0.25	0.572	0.75	0.524	reject
18	amount of resources dedicated to support cooperation in university	0.5	0.825	1	0.775	accept
19	involvement with university (e.g. alumni, lecturer)	0.5	0.75	1	0.75	accept
20	quality certificates (ISO)	0.75	1	1	0.916	accept

According to the experts, the indicators university-industry cooperation was accomplished using the Fuzzy Delphi model. In accordance with Table 5, 20 actions have been taken to promote 12 indictors.

Table 5
Accepted the indicators university-industry cooperation

indicator	**university-industry cooperation**
C1	R&D expenditure
C2	university's governmental income
C3	non-government donations
C4	membership of some association or research group
C5	scholarships number of researchers
C6	projects
C7	perception of researcher about the benefits from the cooperation with industry
C8	perception of the firm about the benefits from the cooperation with university
C9	industry sponsorship of university research
C10	amount of resources dedicated to support cooperation in university
C11	involvement with university (e.g. alumni, lecturer)
C12	quality certificates (ISO)

4.2 Best-worth method

In accordance with the steps of the BWM described above, in the first step, the experts were asked to choose the best and the worst among the indicators (Table 6). After this step, the preference of each criterion is determined in the best and worst matrix (Table 7 and Table 8), followed by the formulation and final weight of the indicators (Table 9).

Table 6
Best and Worst identified by experts

university-industry cooperation	Determined as Best by experts	Determined as worth by experts
C1	2	
C2	4	
C3		
C4		1,2,4,5 ,7
C5	7	
C6		
C7		3
C8		6
C9	1,3,5,6	
C10		
C11		
C12		

As shown in Table 5, the indicator industry sponsorship of university research (C9) is selected as the most important indicator and indicator membership of some association or research group (C4) is selected as the least important indicator.

Table 7
Average comparison of experts in the best indicator

	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11	C12
Best indictor(C9)	2.8	4.7	5.1	6.6	6.1	2.2	4.6	3.7	1	3.3	4.9	4.3

Table 8
Average comparison of experts in the worth indicator

	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11	C12
Worst indictor(C4)	5.1	5.7	4.2	1	3.5	5.1	2.4	5.9	6.6	4.4	3.4	5.7

Table 9
indictor prioritize

	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11	C12
Final weight	0.052	0.46	0.062	0.074	0.075	0.051	0.1	0.044	0.3	0.059	0.077	0.047
Rank	8	11	6	5	4	9	2	12	1	7	3	10

The final ranking of the university-industry cooperation is as follows:

C9>C7>C11>C5>C4>C3>C10>C1>C6>C12>C2>C8

5. Conclusion and Discussion

In this study, the Fuzzy Delphi method and BWM were used to identify and prioritize factors affecting the improvement of communication between industry and university. Accordingly, the following actions are recommended to improve this relationship. First, there is a need for the establishment of joint research centers of the university and industry. It is also necessary for the creation of intermediary firms from the government and the development of the fields of study needed by the industry at the universities. It is also recommended to create the necessary conditions for conducting study opportunities for professors in the country's industries to improve this relationship.

Industries can also express their needs and desires in designing industrial designs and in need of research at universities, and to provide material and spiritual support to related university projects. On the other hand, universities can also focus their research and development efforts on the needs of industries in order to ensure that industry satisfies their needs for academic design and research, and universities are also conducting executive and operationalize their research projects.

Increasing the relationship between industry and academia by applying academic research and industry support will help the cooperation between two units. The regular operation of the university authorities, in addition to helping the country's industrial development, also provide public safety. In Iran, after the arrival of the university and the creation of new industries, the concern of the relationship between the two institutions has always been discussed and, after the revolution of 1979, and especially in recent years, many steps have been taken to promote such a relationship.

The experience of different countries suggests that the establishment and deepening of relationships between industry and the university is an important factor in their social, cultural and economic development. Unfortunately, industry owners are not interested in communicating with the university and enjoying their knowledge, and academics also do not have a clear picture of industrial work. This is despite the fact that the university as the most important element of the educational system of the country can play an important role for the development of science and industry. There is a huge potential for universities that this capacity should be effective in interacting with the industry.

In the developed countries, communication and cooperation between industry and the university has a strong backing. In these countries, most industrial developments have started from universities and research centers, and universities are the pioneer of industrial development, while in developing countries, this relationship is weak and negligible. When there is a weak relationship between industry and the university, the technological development is slowly taking place and ultimately leads to a lack of poor performing industry, industry dependency, loss of social capital, etc. The lack of communication between the industry and the university leads to many social and economic challenges, including the problem of unemployment. In Iran, since the formation of industries, there has been some kind of neglect and even the pessimism among industries and universities. Industry owners are not interested in communicating between universities and using their knowledge and science, and on the other hand, academics and students do not have a clear picture of the owners of industrial and industrial work in their minds, and these issues altogether create a difficult cooperation.

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