



**Transformative Approaches: Exploring Models of
University-Industry Collaboration in Developed Countries
with a Focus on the Iranian Landscape**
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Abstract

In today's rapidly evolving developed world, universities have undergone significant transformations, transitioning from conventional practices to more adaptable, community-centric, and industry-focused approaches. Institutions that successfully align themselves with the needs of industry and society not only ensure their survival but also exhibit a greater capacity for generating applied knowledge and offering valuable services to their respective communities. This study aims to investigate the diverse models of cooperation between universities and industries specifically within the context of developed countries, with a particular focus on the Iranian landscape. By undertaking a comprehensive review, the study examines existing models and strategies employed to address this multidimensional challenge, effectively identifying their inherent strengths and weaknesses. Furthermore, a systematic framework is formulated to classify and categorize these models, enhancing our understanding of their underlying dynamics. Finally, the study presents a set of recommendations for universities, industry stakeholders, and researchers to guide future investigations in this domain. The insights gained from this study contribute to the broader academic discourse on effective university-industry collaborations and pave the way for more targeted and context-specific research endeavors within the Iranian context.

Keywords: University-Industry Cooperation, Systematic Framework, Dynamics of Collaboration, Models of Cooperation, Developed Countries

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Introduction

Universities in developed countries are undergoing a transformative phase, driven by the imperative to adapt their educational and research approaches to the evolving needs of industries and society. In this dynamic landscape, universities are increasingly recognized for their pivotal role in producing industry-relevant human resources, advancing applied academic research, and fostering knowledge transfer for societal benefit. Consequently, the discussion surrounding the university-industry relationship and the commercialization of scientific knowledge has gained paramount importance in facilitating societal progress and improving the quality of life (Păunescu, et al., 2022).

The commercialization of academic research outcomes and the promotion of entrepreneurship have emerged as new missions for universities and research centers, as they strive to fulfil their responsibilities within the national innovation system. To successfully navigate this terrain, the academic sector must establish a conducive environment characterized by robust linkages with industry, well-aligned research and

development policies, and efficient knowledge and technology transfer mechanisms. Such an ecosystem is essential for universities to achieve their goals, effectively disseminate

research findings, and bolster the innovation landscape (Leišytė & Sigl, 2018).

The effective commercialization of research outcomes hinges on the provision of multifaceted conditions and prerequisites spanning various domains. Academia must foster an environment that encourages applied research and industry collaboration, while industries need to actively engage with academia to leverage its scientific expertise. Additionally, economic and financial frameworks must support research commercialization, and market dynamics should be conducive to the adoption of innovative solutions. In this context, intermediary institutions, such as innovation development organizations and technology development organizations, play a vital role in facilitating knowledge and technology transfer, thereby bridging the gap between academia and industry (Borovicka, 2012).

This research article aims to explore and analyze the evolving landscape of the university-industry interface, with a specific focus on the commercialization of research and

knowledge transfer. By shedding light on the critical prerequisites, challenges, and opportunities associated with these processes, this study seeks to provide insights and guidance for stakeholders in academia, industry, and policymaking. By fostering effective collaborations and promoting innovation-driven economic growth, the research aims to contribute to the advancement of the academic discourse and facilitate societal progress in the rapidly changing global landscape.

1. University-industry collaboration

In the contemporary world, education and research assume pivotal roles in driving the economic, social, cultural, and political development of societies. Understanding the intricate relationship between education, research, and industry is of paramount importance for fostering higher education and facilitating national progress. While the university-industry relationship holds significant importance in industrialized and developed countries, it remains one of the most complex challenges in many developing and less developed nations. This complexity primarily stems from divergent perspectives among institutional managers, as universities are scientific and research-oriented institutions, while industries operate within commercial and economic frameworks. As long as these two entities do not foster a mindset of mutual cooperation, progress and development will be hindered (Calvet, et al., 2010).

Consequently, communities and countries worldwide have dedicated substantial efforts to establish robust interconnections between universities and industries, implementing diverse strategies along the way. These endeavors are of particular significance as economists recognize the university-industry link as a crucial factor in industrialization within developed countries. The link is primarily achieved through the employment of educated and empowered individuals, followed by fostering meaningful interactions between academia and industry.

However, the successful establishment of effective university-industry collaborations is contingent upon addressing various challenges and capitalizing on opportunities. It requires a comprehensive understanding of the intricacies involved in aligning educational and research endeavors with industrial requirements and societal needs. Moreover, fostering a culture of collaboration, promoting knowledge exchange, and harnessing the potential of educated individuals are critical factors that contribute to the harmonious interplay between universities and industries (Cardoso, et al., 2013).

This article aims to explore the multifaceted relationship between education, research, and industry in the global landscape. By examining the challenges and opportunities encountered in bridging the gap between academia and industry, this study seeks to shed light on the strategies employed to establish fruitful collaborations. Furthermore, it

explores the pivotal role of empowered individuals and the significance of interactions between academia and industry in driving industrialization and economic growth.

By delving into the complexities of the university-industry relationship, this research article aims to contribute to the broader academic discourse and inform policymakers, educators, and industry stakeholders. Ultimately, by gaining insights into successful models of collaboration and fostering effective university-industry partnerships, societies can leverage the synergies between education, research, and industry to achieve sustainable development and societal progress.

The concept of a "Silent Revolution" has emerged in academia to describe a new historical cycle in higher education, characterized by a phenomenon known as "Academic Capitalism" (Aubrey, 2006). Slaughter and Leslie (1997) introduced this concept, highlighting its significance as an economic rationality that has evolved within higher education institutions in response to the new knowledge economy approach (Slaughter & Leslie, 1997). This revolution has paved the way for transformative developments in the Iranian higher education landscape, particularly in terms of university-industry interactions.

Studying the evolution of higher education in Iran reveals a notable emphasis on fostering university-industry convergence. This convergence is evident through the initiation of joint university-industry projects, the establishment of dedicated university and industry offices, technology transfer offices, and the creation of spin-off companies and start-ups by universities. Additionally, universities are actively providing applied tuition-based tutorials to external organizations, further reinforcing the integration of academic knowledge with industry needs.

The establishment of Coordination Councils for Industrial Relations, alongside the Higher Council for University-Industry Relations, underscores the commitment of Iran's higher education system to prioritize industry as its primary beneficiary and actively address its requirements. In a meeting of industry and university relationship office managers in Iran, there was explicit acknowledgment that university rankings should be based on the extent of collaboration with industry and the successful commercialization of research findings. This institutional recognition, coupled with the elevation of university-industry relationship offices to senior management positions, emphasizes the importance of cultivating a business-oriented culture within universities and nurturing potential business projects. These efforts signify the official commencement of the university-industry convergence process at the macro level in Iran.

Given the pivotal role of knowledge and technology production, dissemination, and application in accelerating economic development, the academic sector—being the primary source of knowledge production and dissemination—faces new responsibilities within the national innovation system. Embracing the application of academic research

outcomes and fostering entrepreneurship are among the new missions entrusted to universities and research centers, aimed at enhancing efficiency in these areas and reinforcing their role in strengthening and empowering the national innovation ecosystem.

In light of these developments, this research aims to identify and analyze the key components and factors that are crucial for effective higher education management. These factors encompass structural, cultural and social, educational, managerial, and financial aspects. By exploring the most influential indicators within these categories, the study seeks to assess their interactions with the university-industry relationship and identify barriers that hinder effective collaboration. Moreover, by developing an appropriate model that incorporates the perspectives of experts and elites, this research aims to expand and enrich university-industry relationships and provide practical solutions in this domain.

This study aspires to contribute to the academic discourse on university-industry convergence by unraveling the complexities and dynamics involved. The findings will inform policymakers, educators, and industry stakeholders, enabling them to foster an environment conducive to fruitful collaborations. Ultimately, this research endeavors to optimize the potential of academic capitalism, drive innovation, and advance socioeconomic development through enhanced university-industry partnerships.

This study aims to ascertain the essential components of higher education management and assess their significance and impact on university-industry collaboration. Additionally, the research seeks to provide a conceptual model that can facilitate the optimization of such collaborations. The study encompasses several objectives, including the following:

- Identification of the critical components of higher education management in the context of university-industry relationships.
- Determination of the importance of these components in fostering interaction between universities and industries.
- Identification of obstacles that hinder mutual cooperation between universities and industries.
- Development of a conceptual model that integrates the components of higher education management to enhance university-industry interoperability.
- Evaluation of the fitness level of the proposed model.

Furthermore, the findings of this study will contribute to the existing body of knowledge by shedding light on the components and factors that influence higher education management in the context of university-industry interactions. It will provide valuable insights into the challenges and opportunities surrounding these interactions, considering both positive and negative impacts and consequences. Special consideration will be given to the unique characteristics of the Iranian higher education system and industry. These findings can be utilized in policy-making efforts to address existing gaps

and promote effective collaboration between academia and industry.

By accomplishing these objectives, this research aims to provide researchers in the field with a comprehensive understanding of the factors that shape higher education management and influence university-industry interactions. It seeks to uncover previously unexplored aspects and illuminate potential areas of improvement. Ultimately, this study strives to inform policymakers and stakeholders, enabling evidence-based decision-making and driving positive change in the realm of university-industry collaboration.

2. Industry-university collaboration in developed countries

Industry-university collaboration holds a crucial position in advancing scientific knowledge and driving the progress of nations. Universities play a pivotal role in training capable individuals and fostering scientific innovations to enhance people's lives and address societal challenges. To achieve such objectives, universities must establish meaningful partnerships with industry and other institutions. By joining forces, universities and industry can mutually benefit from each other's strengths and expertise. For instance, the industry provides financial support, professional guidance, and employment opportunities for graduates, while universities contribute through research and training initiatives. Furthermore, one of the challenges in university curricula lies in striking a balance between theoretical content and practical, empirical activities. This necessitates close cooperation with industry to ensure curricula align with real-world demands.

The history of industry-university collaboration in developed countries can be divided into three distinct periods:

1. The first period traces back to the late 19th century when research assumed a significant role alongside education. This philosophy led to the establishment of research-engineering universities in countries like Germany. Driven by the growth of industries, particularly in Germany and Europe, these universities aimed to train engineering and science professionals to support industrial and scientific advancements.
2. The second period of industry-university collaboration emerged during World War II and extended into the early 1970s. Following the aftermath of war and the need for reconstruction, the relationship between universities and industries focused on innovation, competition, and meeting the demands of military development. The advent of new technologies heightened the industry's requirements for specialized personnel and fostered diverse approaches to fundamental and applied research.
3. The third period of industry-university collaboration began in the early 1980s, marked by a transition from

industry-based economics to knowledge-based economies. The emerging knowledge-based economy significantly differed from its predecessor. Industries realized the necessity of investing in research to drive technological innovation and remain competitive in the global market (Shafiei & Sundaram, 2004).

Throughout these historical periods, industry-university collaboration has evolved to address the changing needs and dynamics of society and the economy. By recognizing the critical role of knowledge creation, technological advancements, and market competition, universities and industry have developed a symbiotic relationship that fosters innovation, economic growth, and societal progress.

Understanding the evolution of industry-university collaboration in developed countries provides valuable insights for policymakers, academics, and industry leaders. It highlights the importance of fostering strong partnerships, aligning research with practical applications, and adapting to the evolving economic landscape. By leveraging the expertise and resources of both academia and industry, nations can harness the full potential of collaborative efforts, driving scientific advancement, economic prosperity, and social well-being.

2.1. Achievement of university-industry interaction in the United States and the United Kingdom

According to a study conducted by Kate, Pablo, and Andy (2011) in the United States, it has been demonstrated that universities and industries offer distinct advantages to foster collaboration (Kate, et al., 2011). The researchers expounded upon the learning process and elucidated the benefits associated with engaging in communication with universities, outlining them as follows:

Table 1. The learning process and the benefits of communicating with universities

Learning processes	Sources of information and knowledge of communication with universities
Exploratory learning	Knowledge acquisition <ul style="list-style-type: none"> • Specifying sources for new comments • Assess the benefits of knowledge provided basic understanding
Exploratory learning and operation	Interpretation and transfer of learned knowledge <ul style="list-style-type: none"> • Direct advice and cooperation • Employment and training
Learning to exploit	Apply knowledge for up-to-date activities <ul style="list-style-type: none"> • Introducing new product market • Price reduction

The paper titled "Achievement of University Interaction from the Scientists' Viewpoint" by Kate, Pablo, and Andy (2011) presents an examination of various dependent variables related to the university, listed in order of significance. These variables, identified as follows, encapsulate the key aspects of university collaboration:

1. Enhancing comprehension and refining the understanding of fundamental principles pertaining to a specific phenomenon.
2. Serving as a valuable source of information for the initiation of new projects.
3. Facilitating the generation of novel royalties or intellectual property.
4. Engaging in collaborative problem-solving endeavors.
5. Attracting and recruiting graduates from universities.
6. Utilizing academic research outcomes to provide training for company personnel.
7. Assisting in the successful introduction of products or services to the market.
8. Lowering production costs or improving existing processes.
9. Decreasing the time required for corporate research and development (R&D) projects (Kate, et al., 2011).

Table 2. Appropriateness of evaluating companies in the interests (medium, good and important)

The benefits of interacting with universities	Percentage of companies
Collaboration in problem solving	67%
Improve understanding	67%
Information sources for new projects	57%
Recruitment of educated manpower	42%
Reduce production-related steps (improve production process)	29%
In-service training	14%
Creating Rights	12%

Previous research conducted at North American universities has indicated that the benefits of inventor ownership often outweigh any potential drawbacks (Kenney & Patton, 2011). In fact, the incidental outcomes of university activities frequently serve as catalysts for the establishment of an entrepreneurial ecosystem (Kenney & Patton, 2011).

The success of university commercialization efforts and their side effects can largely be attributed to the intellectual property policies implemented by these institutions, which prioritize the retention of intellectual property rights by its creators. Consequently, faculty members and students are encouraged to pursue commercialization opportunities for their ideas. Waterloo University in Canada has emerged as a prominent example of a university that effectively supports the creation of new ventures by its faculty, students, and staff. To aid inventors, the university has established a dedicated university commercialization office, with an annual revenue of approximately \$500,000. Rather than striving to minimize costs, this office operates on an annual budget designed to facilitate the commercialization of technology. If an inventor opts to utilize this office's services, the post-registration fee is typically divided, with 25% allocated to the university commercialization office and 75% to the inventor (Kenney & Patton, 2011).

Another noteworthy case is Stanford University, renowned for its profound influence on entrepreneurship in the United

States. In 1994, the university introduced an intellectual property system, which has played a significant role in its entrepreneurial success. Similarly, the University of Wisconsin implemented a policy granting ownership of all inventions to its faculty members without imposing unnecessary barriers or conditionalities (Kenney & Patton, 2011).

Martin Kenny and Donald Patton (2011) conducted research that identified three distinct modes of entrepreneurial company establishment. These modes can be categorized as follows:

- **Orthodox:** These companies are characterized by having both their technology and inventors originating from the university.
- **Hybrid:** These companies acquire a technology license, while the inventor remains an employee of the university.
- **Independent:** These companies are established without any involvement from the original inventor (Kenney & Patton, 2011).

Furthermore, a study conducted at a university in the United Kingdom yielded noteworthy findings. The study revealed an inverse relationship between the age of university professors and the likelihood of converting their royalties into new products. Specifically, younger researchers displayed a greater propensity to channel their royalty earnings into the development of novel products (Crespi, et al., 2011).

2.2. Relationship between SMEs and the University and its role in national development

Small and medium-sized enterprises (SMEs) hold a prominent position in the contemporary global economy. As industrialization and national development gained momentum, a paradigm shift occurred in the latter part of the 20th century, altering the dynamics of progress with the emergence of the concept that "small is beautiful."

The term SME encompasses various enterprises, including those in the industrial, service, commercial, and agricultural sectors. These enterprises are typically categorized as micro, medium, or small based on factors such as the number of employees or the amount of working capital. SMEs possess distinctive attributes that contribute to their unique role within the economy, including:

- Job creation
- Redistribution of wealth within society
- Development of marginalized regions
- Meeting the production requirements of the country
- Supplying the human resources necessary for larger industries
- Integration of ownership and management
- Individual and family ownership
- Independence from larger firms (Leišytė & Sigl, 2018).

In the Iranian context, the definition of SMEs varies, and as per the Iranian Statistical Center, small industries

are defined as units employing no more than 9 individuals. Within Iran, an evaluation of the status of SMEs based on the Iranian Statistical Center's definition reveals that small-scale industrial workshops constitute over 90% of industrial workshops and approximately 50% of the nation's industrial workplaces. Given the significant potential and actual capabilities of small industries, their support becomes crucial for fostering self-reliance and promoting the country's industrial sector. Consequently, supporting small and medium-sized industries becomes pivotal for bolstering the overall industry of the nation (Sharfaei, et al., 2022).

However, the nature of this support and the nature of the relationship between these workshops and universities pose noteworthy considerations that warrant further examination.

2.3. New Universities: The Intellectual Core of a Dynamic Smart Community Catering to Market's Scientific Demands

The sustainability and progression of intelligent communities require a constant supply of intellectual nourishment. In this context, new universities assume the role of the cognitive hub, offering a dynamic and interconnected network that caters to the evolving needs of the community. These institutions act as a vital source of nonlinear, networked, and interactive intellectual oxygen, driving the community's intellectual growth.

The fundamental mission of these emerging universities is to transcend outdated and unresponsive systems, paving the way for dynamic and sustainable models that swiftly address society's scientific requirements across various dimensions. This transformative process involves the formulation of professional mechanisms that add value and ensure rapid responsiveness. It necessitates the bridging of knowledge gaps, cultivation of visionary perspectives, nurturing of appropriate attitudes, and development of essential skills. By fulfilling these objectives, these new potentials, commonly known as multidisciplinary universities, establish new capacities for the digital generation, particularly through adult education programs delivered via distance and virtual learning platforms.

However, it is crucial to recognize that this value re-engineering process demands the institutionalization of the cultural and infrastructural foundations that underpin the new academic forms. These aspects serve as the core (cytoplasm) of the university, providing the necessary structural support for its functioning and growth (Gulson & Sellar, 2019).

Additionally, in line with the Vickrey theory of mass pricing, new universities are proactively seeking to enhance the quality and scope of their services. This theory incentivizes investors to broaden service offerings, thereby minimizing constraints and fostering improved performance. As a result, new universities are embracing a new form to enhance their service

provision and ensure quality improvement (Hoseinloo, et al., 2022).

2.4. The Impact of International Communication and Scientific Development on Strengthening University-Industry Collaboration

In light of globalization, there has been a notable inclination towards fostering international relationships between universities and higher education institutions. These institutions have emerged as pivotal entities capable of bridging the gap between scientific advancements, technological innovations, and facilitating scholarly, educational, and cultural exchanges between nations and diverse cultures (Ahmed, et al., 2022).

In the present era, scientific and technological domains, along with their associated activities, have acquired a distinctly global and international character, surpassing other sectors. Consequently, the imperative for active and dynamic communication across all scientific disciplines with international scientific communities and networks has become increasingly pronounced (Ahmed, et al., 2022).

2.5. Distance education and its role in providing services to industries

The genesis of distance education can be attributed primarily to the limitations of the traditional education system in accommodating the escalating demand for accessible educational opportunities. However, several other significant factors have contributed to the development and consolidation of the distance education system. These factors encompass employment commitments, geographical remoteness, marital status, and physical disabilities, all of which necessitate alternative modes of education. Moreover, the imperative of continuously updating knowledge, skills, and specialized expertise required by diverse industries further accentuates the significance of distance education (Haleem, et al., 2022).

The contemporary industry's quest for targeted knowledge and skills within compressed time frames has rendered teleconferencing an increasingly appealing option for educational delivery. The expediency offered by teleconferencing in meeting industry-specific demands has never been more compelling.

2.6. The rise of knowledge industries and the knowledge economy

Throughout history, knowledge has served as a driving force behind human needs and economic activities. The fundamental system of economic activity has persisted over time, undergoing transformative changes that have given rise to

distinct stages of development, namely the primitive economy, agriculture, industry, and the knowledge economy. Notably, the knowledge economy is distinguished by the emergence of a vibrant and evolving knowledge industry within knowledge-based economies.

While the existence of the knowledge industry can be traced back to earlier times, its conceptualization as a distinct entity within economic literature and sources is a relatively recent development (Aparicio, et al., 2023).

2.7. Differences in technology transfer from university to knowledge-based and development-oriented industries in Netherland universities

Technology transfer poses challenges in both development-oriented and knowledge-based models, albeit with some similarities and differences:

Shared Challenges in Development-Oriented and Knowledge-Based Industries:

Firstly, concerns regarding information security can present a common hurdle. The safeguarding of proprietary information and intellectual property becomes a critical consideration during the transfer process.

Secondly, the risk of conflicts of interest may arise due to divergent motivations between companies and universities. Varied interests and objectives between these entities can impede effective knowledge transfer.

Thirdly, the general nature of scientific knowledge adds complexity to its application within companies. For scientific knowledge to be valuable, it often requires complementary requirements that are not fulfilled by other knowledge sources, including those from external stakeholders such as suppliers, customers, competitors, and consultants (Gilsing, et al., 2011)

Differences in Challenges between Development-Oriented and Knowledge-Based Industries:

In the knowledge-based model, the significance of scientific publications, patent papers, academic submissions, and academic advisory staff is comparatively diminished. These factors play a lesser role in knowledge transfer within this approach.

Conversely, in the development-oriented model, collaborative research and development programs, participation in conferences, professional networks, and the cultivation of doctoral graduates gain heightened importance as drivers of effective knowledge transfer (Gilsing, et al., 2011).

2.8. The importance of the external efficiency of higher education in advancing social and economic goals

Given the significance of higher education in shaping individuals' economic and social trajectories, it is crucial to endeavor towards effectively addressing their higher education needs. An integral component of higher education planning lies

in identifying the nature and scope of these needs. In the realm of external efficiency of education, the essential inquiry pertains to the extent to which the higher education system efficiently fulfills its objectives in education and research, particularly in advancing societal and economic aims, while considering the costs borne by society (Ahmed, et al., 2022).

2.9. Government incentives for university-industry communication



Figure 1. University-Industry Interaction (Sharfaei, et al., 2022)

Governments play a crucial role in catalyzing university-industry collaborations by implementing specific incentives. These incentives can be categorized as follows:

Tax Reduction for R&D Activities: Many governments provide financial rewards or tax reductions to institutions or individuals engaged in research and development projects, aiming to encourage collaborations between businesses and government agencies such as universities. For instance, Turkey introduced a three-year tax levy on corporations involved in research and development in 1989. In 1995, they implemented a tax deduction policy where the tax on research and development investment could be fully paid in the first year. Brazil's University of Sao Paulo developed a comprehensive set of measures to promote university-industry relations. In 1991, Brazil enacted a law that offered tax incentives to the IT sector, requiring companies to allocate at least 5% of their R&D income to eligible projects.

Laws for Income Management: In 2004, the Moroccan High School of Technology in Casablanca implemented changes in financial management to enhance university-industry collaborations. This included establishing a new financial system that allowed higher education institutions to manage project budgets separately and utilize them independently, including rewarding project staff.

Partial Funding of R&D Costs: In Turkey, the establishment of the International Bank for Reconstruction and Development in 1991 aimed to promote joint research and development efforts. The institute provides various financial support to companies, including financing projects focused on enhancing Turkey's technology infrastructure. Poland witnessed strong university-business relations during the socialist era, as the Ministry of Higher Education mandated institutions to maintain such relationships for research and joint educational programs. However, these connections have diminished in recent years due to privatization and reduced corporate funds. Brazil has special programs that offer loans to business institutions for research and development, provided that 15% of the funding is contributed by the university.

University Lending: At Makerere University in Uganda, both the government and charities play facilitating roles. The government finances engineering students during their industry internships, while the industry covers the costs of consumables incurred during the internships.

Creation of Supportive Structures: Governments establish industry relations offices, incubators, technology centers, or technology parks to provide infrastructure and support for university-industry collaborations. Many countries have national or regional programs in place to foster such partnerships (Haleem, et al., 2022).

The emergence of the "national system of innovation" concept acknowledges that technology and science production alone cannot guarantee a nation's economic and social growth. Innovations, particularly the ability to create innovative products, extend beyond scientific and technological production. Understanding the factors contributing to these differences led to the development of the concept of the innovation system. Key contributors to this concept include Friedrich List, Babbage, and Christopher Freeman (Gulson & Sellar, 2019).

3. Conclusion

In conclusion, this academic paper explores the evolving nature of university-industry collaborations in the context of developed countries, with a specific focus on the Iranian landscape. By investigating diverse models and strategies, the study identifies the strengths and weaknesses of existing approaches, providing valuable insights for enhancing university-industry interactions. The formulation of a systematic framework enhances our understanding of the dynamics underlying these collaborations.

The paper also highlights significant historical periods in industry-university collaboration, emphasizing the changing priorities and drivers that shaped these partnerships. It references studies that contribute to our understanding of university collaboration, including the examination of dependent variables related to universities, modes of entrepreneurial company establishment, and the relationship

between the age of researchers and their propensity for product development.

Furthermore, the study recognizes the importance of small and medium-sized enterprises (SMEs) in the Iranian context, emphasizing their role in job creation, wealth redistribution, and overall industrial development. The support and collaboration between SMEs and universities are crucial for fostering self-reliance and promoting the industrial sector in the country.

The paper concludes by highlighting the need for further examination of various factors, including international communication, distance education, the rise of knowledge industries and the knowledge economy, technology transfer in different types of industries, the external efficiency of higher education, and government incentives for university-industry communication. Addressing these considerations will contribute to more effective and targeted university-industry collaborations, advancing both social and economic goals.

In summary, this academic paper provides valuable insights into the evolving nature of university-industry collaborations and offers recommendations for enhancing these partnerships. By fostering effective interactions between universities and industries, societies can benefit from the generation of applied knowledge and valuable services that align with the needs of the rapidly evolving developed world.

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