

The Role of State Policy in Industry-University Collaboration: Evidence from South Korea

Tukhtabayev Mirzokhid Akhmadjanovich^{1*}, Ismoilov Temurbek Islomovich², Atakhanov Khoshimjon Boymirzayevich¹, Xidirov Ulugbek Xabibullaevich¹

¹ Namangan State Technical University, Logistics/Transport Faculty, Islam Karimov Avenue-12, Namangan, 160103, UZBEKISTAN

² Namangan State Institute of Foreign Languages named after Iskhokhon Ibrat, Faculty of Philology, Turakurgan District, Namangan, UZBEKISTAN

*Corresponding Author: mirzoxidta@gmail.com

DOI: <https://doi.org/10.30880/jtet.2026.18.01.022>

Article Info

Received: 27 February 2026

Accepted: 5 May 2026

Available online: 24 June 2026

Keywords

State policy, industry-university collaboration, technical education, workforce development, South Korea, TVET reform

Abstract

This study also examines how state policy creates linkages between industry and universities, education in technology, and workforce development in South Korea. It is now a calculated priority for knowledge-based economies to match the higher education system with industrial transformation. Applying a qualitative case study approach, we analyse how policy tools, funding mechanisms, rules, and performance-driven evaluations contributed to institutionalizing collaboration, and conclude that state coordination improved internship systems, access to applied research, and technical skills development. The article shows how state policy acts as a catalytic element in aligning the interests of institutional actors in achieving a balance between strategy and organizational autonomy. The case of South Korea illustrates how such a policy regime shapes enduring collaboration and eventually influences worker-level outcomes. The paper makes a theoretical contribution through reconceptualizing the Triple Helix for a state-led context and a practical contribution in terms of implications for emerging economies seeking to modernize technical education systems.

1. Introduction

Many of the world's technical and advanced education systems are going through a process of reform, driven by rapid technological change and digitalization as well as the changing nature of labour markets. Governments have increasingly recognized that sustainable economic development requires not only industrialization but also a system of education that produces industry-ready graduates with the right technical skills (Bulajeva and Meškauskienė, 2026; Lundvall, 1992; Nelson, 1993). In knowledge-based economies, aligning universities and technical institutes with the skill needs of industries has become a key policy concern.

University-industry collaboration (UIC) is thought to reduce skills mismatch and improve employability. Universities are at the heart of national systems of innovation and knowledge production and technology development (Lundvall, 1992; Bulajeva and Meškauskienė, 2026). The Triple Helix model also views innovation as an interactive knowledge generation process by universities, industry, and government, with institutions overlapping during this process (Etzkowitz and Leydesdorff, 2025; Etzkowitz, 2008).

This is an open access article under the CC BY-NC-SA 4.0 license.



Early empirical studies of university-industry collaboration focused on research commercialization and patenting outputs (Sun et al., 2025; Yang et al., 2026). More recent research focuses on human capital formation and technical skills as key productivity benefits of university-industry collaboration (Suh et al., 2019; Marginson, 2016). In recent years, many technical education and training institutions have implemented internships, an apprenticeship system, and industry-sponsored projects to increase employability of graduates (Shin, 2012; Choi, 2015).

Nevertheless, the effectiveness of teamwork does not happen naturally. State policy assumes a leading role in the creation of regulatory norms, funding systems and institutional incentives that define long term partnerships (Lee et al., 1991; Lim, 2016). It is popularized as the developmental state model in which the strategic efforts by the government to coordinate its next steps for industrial and organizational development are speeded up by strategic coordination by the state government (Kim, 1997; Woo-Cumings, 1999). In that regard, state intervention, rather than acting as a central control tower, should be seen more as a facilitator in aligning the output of the education sector with the industrial transformation goals (OECD, 2019; World Bank, 2020).

South Korea's education system transformation has been shaped by long-term labor and skills development policies (Kwon, 2011). The example of South Korea offers an interesting opportunity to consider the role of state policy in institutionalizing industry-university collaboration. Within the last 50 years, the nation transformed its production system and economy to focus on a high-technology innovation economy. The change was facilitated with coordinated industrial planning and performance-based funding system, and structured higher education reforms (Lee et al., 1991; Yang et al., 2026; Yun et al., 2025). Technology transfer offices, internship requisites, and University-Industry Cooperation Foundations (UICFs) sponsored and supported by the government strengthened the real-life training ecosystems and technical workforce preparation.

The recent research also proves that the performance of engineering staff training can be greatly improved with the help of the well-organized system of the industry-education interaction (Karimov, 2020). Regulations that govern cooperation, including a sense of accountability, ongoing assessment, and alignment to the curriculum, enhance the performance of the institution and graduate efficacy (Yusupov, 2021). The creation of industrial practice bases has helped to gain practical skills and become professionally ready (Abduvaliev, 2022). Furthermore, when talking about policy transfer, it is important to note that adapting the Korean model would require coherent ruling structures, instead of a superficial imitation (Tukhtabayev, 2025).

Although much is known about the nature of innovation systems and higher education reform, little has been done to understand exactly in what way the state policy has anything to do with industry-university collaboration within the framework of technical education and training. Much of the existing literature concentrates on macroeconomic outcomes or research commercialization indicators, but less emphasis is placed on how policy tools have an effect on curriculum integration, internship systems and workforce readiness.

Moreover, the world value chain integration insights bring to light the growing role of the skill-intensive production systems and the adaptability of the technical workforce (World Bank, 2020; OECD, 2019). The need of modernization of technical and vocational training by the countries has necessitated investigation of how integration of policies facilitate sustainable models of collaboration.

This paper will fill this gap by looking at the role of state policy to develop mechanisms of industry-university collaboration in South Korea and what the role of these mechanisms has been in developing and maintaining the technical education and workforce development systems in South Korea. The study will in particular aim at answering the following research questions:

- i. Which policy instruments and regulatory frameworks formed industry-university collaboration in South Korea?
- ii. What impact did state-supported mechanisms have on technologic ability development and employability of graduates?
- iii. What can be learnt with regards to the reform in technical education in emerging economies?

This paper is about the research on policy-based cooperation in education. The example of South Korea is really useful to see how the government helps the development of workforce and innovation. The research looks at three things. First, it looks at how universities and industries work and how the government policies affect the development of workforce not just the commercial side of research.

Second it takes a look, at the Triple Helix model showing how the government can change the way institutions interact with each other in countries that are still developing their industries.

Third it gives information to countries that are still growing by looking at what helps and what hinders the models of cooperation that are led by the state as seen in the work of Karimov and Yusupov (Karimov, 2020; Yusupov, 2021).

1.1 National Innovation Systems and State Coordination

The idea of National Innovation Systems (NIS) is important for understanding how different groups work together to create things and help the economy grow. Some early researchers like Freeman (1987), Lundvall (1992) and Nelson (1993) said that new ideas do not come from one person or group but from many people and organizations like universities, companies and the government working together. Universities are a part of this because they create knowledge and are connected to the rest of the community.

In countries that are still developing their industries the government plays a role in helping them grow and improve quickly. Researchers have found that governments can help by creating policies that support industry, education and innovation (Woo-Cumings, 1999; Kim, 1997). South Korea is an example of this, where the government helped the country change from making simple things to making more complex and technological products (Lee et al., 1991).

Some newer studies have shown that if the government controls too much it can actually make it harder for people to adapt and try new things. This means that while it is good to have some coordination it is also important to find a balance between control and freedom. National Innovation Systems need to be able to change and grow over time (Lim, 2016). This balance is crucial for long-term success. National Innovation Systems are, about finding this balance and making sure that universities, industry and government are all working together to create new things and help the economy grow.

1.2 State Policy and Technical Education Transformation

Technical and vocational education and training (TVET) systems or vocational education and training systems are working more closely. These companies to make sure that the skills people learn are relevant and that they are ready to work (Abduvaliev, 2022). This is what the vocational education and training systems are doing. Research shows that when governments make rules like requiring internships or apprenticeships and when companies are involved in creating school curricula it really helps people get jobs. For example, technical and vocational education and training systems are using these methods to improve employability outcomes (Shin, 2012; Choi, 2015).

The historical evolution of labor-oriented education systems in South Korea demonstrates how policy coordination contributed to workforce development and industrial upgrading (Kwon, 2011).

In countries with economies universities are getting money based on how well their students do in the job market and how well they work with companies. So technical and vocational education and training systems are adopting this approach too (Marginson, 2016; Lim, 2016). This way of funding universities makes them more accountable. Helps them work better with companies but it can also make them focus too much on making money. The vocational education and training systems need to be careful about this.

International organizations, like the OECD and the World Bank say that countries need to have plans in place that bring together education and industry if they want to compete (OECD, 2019; World Bank, 2020). If a country does not have a plan, like the technical and vocational education and training systems it can lead to people not having the right skills, for the jobs that are available and the country not being able to innovate.

1.3 Institutional Mechanisms of University-Industry Collaboration

The literature talks about some ways that universities and industry can work together in a way. These ways include things like University-Industry Cooperation Foundations and Technology Transfer Offices. They also include research centers and internship systems that are well organized (Yang et al., 2026; Sun et al., 2025).

These things help with getting knowledge out into the world and making sure people have the skills they need to work. They do this by connecting what people learn in school to what happens in the world. Some studies have shown that when students get to work in industry environments they get better at solving problems and are more likely to get a job (Suh et al., 2019).

In South Korea they have found that when they manage the relationship between industry and education in a way it makes engineering training more effective. It also makes the institutions more accountable (Karimov, 2020; Yusupov, 2021). When they create places where people can practice what they have learned it makes them more ready for their careers (Abduvaliev, 2022).

For all of this to work there needs to be a good system of governance in place. If there is not a plan then the efforts to collaborate will not be sustainable and will be all over the place. University-Industry Cooperation is very important. It needs to be taken care of. University-Industry Cooperation can make a difference, in peoples lives and in the way businesses work.

1.4 Research Gap and Contribution

There are still some things that we do not know about innovation systems and university and industry collaboration even after a lot of research.

First most of the research that has been done looks at picture ideas like how new things are made or how research is used to make money but it does not look at how specific government policies affect the way that people are trained for jobs like internship programs or the way that subjects are taught in school.

Second, we do not really understand how government policies work with the Triple Helix model in countries that are still developing their industries. For example, in South Korea the government has a lot of control over things. It is not clear if this works with the ideas of the Triple Helix model or if it is a different version of it.

Third a lot of studies just assume that when universities and industries work together because of government policies it is always a thing but they do not think about the potential downsides, like universities having less freedom to make their own decisions or some institutions being treated unfairly.

This study looks at how government policies, in South Korea affect the way that universities and industries work together and how this affects the people who are being trained for jobs. It also thinks critically about what this means for the Triple Helix model and how it is understood.

2. Methodology

This study looks at how the government's policy affects the way universities and industries work together in South Korea. It wants to see how this partnership impacts the kind of education people get to learn skills and the jobs they get. A case study is a way to do this because it helps us understand complicated things like how the government works and how policies affect each other in a specific country, like South Korea as seen in the work (Yin, 2018).

2.1 Research Design and Case Selection

The research is about understanding how things work and also about finding things. It wants to explain how the government uses tools to help universities and industries work together and it also wants to see what this means for people getting jobs and developing their skills.

South Korea is an important example for this research. This is because the country used to be about doing work but it changed to be about using knowledge and new ideas and the government played a big role in making this happen. South Korea shows how a country can use its government to make changes (Lee et al., 1991; Kim, 1997). They make its schools and industries work together which is called a developmental state and this is what the research, on state policy instruments and university-industry collaboration systems is looking at particularly in the context of state policy instruments and university-industry collaboration systems.

2.2 Data Sources and Collection

To make sure our study is thorough and reliable we used different sources of existing data:

- a) Policy and institutional documents
 - OECD innovation policy reports (OECD, 2019);
 - World Bank development reports (World Bank, 2020);
 - Korean government policy frameworks on higher education, industrial development, and TVET reform.
- b) University-level institutional reports
 - Documentation of University-Industry Cooperation Foundations (UICFs);
 - Internship programs applied research initiatives, and technology transfer activities.
- c) Academic literature
 - Peer-reviewed studies on university-industry collaboration and innovation systems;
 - Developmental state theory and Triple Helix framework.
- d) Empirical statistical indicators (2015–2022)
 - Engineering graduate employment rates;
 - Internship participation rates;
 - Growth of industry-funded research projects;
 - Joint patent activity.

Using data sources makes our study more trustworthy and helps confirm our findings (Bowen, 2009).

2.3 Analytical Framework

The study uses a way of working together that connects what the state does to help people get jobs. This way of working has three main parts that are all connected, to each other:

1. Policy Instruments
 - Performance-based funding systems;
 - Regulatory accreditation standards;
 - Government-supported innovation clusters.
2. Collaboration Mechanisms
3. University–Industry Cooperation Foundations (UICFs);
4. Mandatory internship systems;
5. Technology Transfer Offices (Sun et al., 2025).
2. Workforce Outcomes
 - Graduate employability;
 - Practical skill acquisition;
 - Applied innovation capacity.

This framework is theoretically grounded in National Innovation Systems theory (Nelson, 1993), the Triple Helix model (Etzkowitz and Leydesdorff, 2008), and developmental state perspectives (Woo-Cumings, 1999).

2.4 Data Analysis

The study applies thematic content analysis to examine policy documents and institutional materials (Braun and Clarke, 2006). The analytical process involved:

- Coding key policy instruments influencing collaboration structures;
- Identifying governance mechanisms and institutional arrangements;
- Mapping relationships between policy interventions and collaboration outcomes;
- Interpreting workforce development trends in relation to policy changes.

In addition, quantitative indicators were analyzed descriptively to illustrate longitudinal trends in employment, internship participation, and research collaboration between 2015 and 2022.

2.5 Validity and Limitations

The study on education systems is trying to be as accurate as possible. To do this it uses a lot of information like policy documents and institutional reports. The study is looking at things in a way rather than just looking at numbers, which is what you do in a case study (Yin, 2018).

There are some things that the study cannot do. For example it only uses information that already exists and it does not talk to people directly. The study is also only looking at one situation so its findings may not be true in other countries. The numbers in the study are just used to describe things they do not try to figure out why things happen.

With these limitations the study is still very useful for understanding how the state affects the way technical education systems work together. The technical education systems are what the study is really looking at. It wants to see how state policy shapes collaboration mechanisms, within technical education systems.

3. Findings

3.1 State Policy Instruments Institutionalizing Collaboration

The study shows that the government in South Korea did a job of making universities and industries work together. They did this by setting up systems to give money to projects that work well and by making rules that everyone has to follow. This is different from countries where universities and industries only work together if they want to. In South Korea the government made sure that universities and industries work together as part of the country's plan to develop (Lee et al., 1991; Woo-Cumings, 1999).

One of the things the government did was to give more money to universities that work closely with industries. If a university can show that it is working with industries giving students internships and doing research that can be used in life it gets more money (OECD, 2019). This way of doing things makes sure that universities are doing a job and are not just working on their own.

In South Korea they also set up groups called University-Industry Cooperation Foundations (UICFs). These groups help universities and industries work together in an organized way. They make sure that research projects are managed well that students get internships and that new technologies are shared. This is similar, to what some

experts call the Triple Helix framework, which says that governments, universities and industries should work together (Etzkowitz and Leydesdorff, 2025).

3.2 Internship Ecosystem and Technical Skills Development

A big thing we learned from this study is that internship programs are getting bigger and better. The government made some rules that said engineering and technical schools have to include internship experience in their programs. This means that students have to work in the industry to graduate it is not something they can choose to do.

As you can see in Table 1 more and more students are doing internships. In 2015 65 percent of students did internships but by 2022 that number went up to 86 percent. This is because the government is helping to make sure internship programs are well organized. We can see that internship programs are really helping students get jobs after they graduate. Internship programs are making a big difference, in the lives of students and internship programs are becoming more popular.

Table 1 Workforce development indicators associated with state-supported industry-university collaboration in South Korea (2015-2022)

Indicator	2015	2018	2022
Engineering Graduate Employment Rate (%)	78	84	91
Students Completing Internships (%)	65	72	86
Industry-Funded University Projects (Annual Growth %)	12	18	27
University-Industry Joint Patents (Annual Growth %)	9	14	22
TVET-Linked Industry Partnerships (Growth %)	10	16	25

The establishment of industrial practice bases really helped students get better at what they do (Abduvaliev, 2022). Students got to work with production technologies and this helped them get used to the workplace and solve problems (Choi, 2015; Shin, 2012). Industrial practice bases are great for students because they get hands-on experience with production technologies. This makes students better, at solving problems and working in a workplace. Industrial practice bases are very important for students to learn and get skills.

3.3 Employment and Workforce Outcomes

The data shows that workforce results got better after policy coordination improved. Engineering graduates finding jobs went up from 78 percent in 2015 to 91 percent in 2022 (Figure 1). This increase shows that working together on policies helped people find jobs. Also, universities got projects funded by industries during the same time which means industries are working more closely with universities. More patents, from work also shows that industries and universities are doing more research together (Yang et al., 2026).

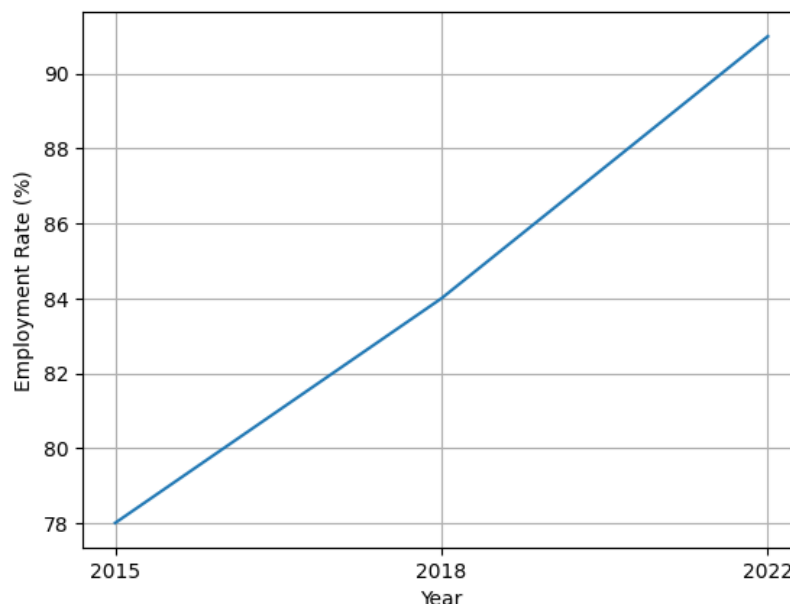


Fig. 1 Trend in engineering graduate employment rate in South Korea (2015–2022)

These findings support the national innovation system theory. It says that institutions need to work for a country to develop its economy in a sustainable way (Bulajeva and Meškauskienė, 2026; Nelson, 1993).

3.4 Technology Transfer and Applied Innovation

Technology Transfer Offices (TTOs) helped connect university research to real-world use. This happened because governments offered rewards to universities to turn research into applications (Sun et al., 2025) and get students involved in hands-on innovation projects. Universities and industries worked together closely. This is shown by the increase, in patents and research projects funded by industries.

Universities and industries did not just work together on school projects. They also worked together on technology development. Technology platforms made it easier for universities and industries to work together (Ismailov et al., 2022; Rakhimov, 2023). They helped share knowledge and ideas efficiently.

3.5 Integrated Impact of State Policy

The findings show that the state policy was like a helper that brought people together rather than a boss that told everyone what to do. The government did this by giving money to people who worked together changing rules to make it easier and checking to see if things were working. This helped people work together in a way that was good for the environment and good for people.

The way that the government, schools and companies worked together with internships and research projects helped people get the skills they needed for jobs. This way of working is different from what happens in other places where people do not work together as well. The Korean model is special because it brings everything together which is different, from other places where things are not as organized.

4. Discussion

The results show that state policy helps universities and industry work together. The Korean model is a good example of how policy alignment can make things better by reducing fragmentation and improving workforce development outcomes. In South Korea they make sure universities and industry work together as part of their development plans. This means they work together in an sustained way (Lee et al., 1991; Woo-Cumings, 1999). People like Lee and others have written about this before. They said that for innovation to happen universities and industry need to be aligned. Other people like Bulajeva, Meškauskienė and Nelson have also said this (Bulajeva and Meškauskienė, 2026; Nelson, 1993).

We can see that more students are taking internships and engineering graduates are getting jobs. This shows that when universities and industry work together it has an impact on the workforce. In South Korea they make students take part in practice as part of their technical programs. This helps reduce skill mismatches and makes students more ready for the workplace. People like Shin and Choi have done research on this before (Shin, 2012; Choi, 2015). They agree that hands-on learning is important, for technical and vocational education systems. The growth of research projects that are funded by industry and joint patent work shows that companies and universities are working together on technology. This is what the Triple Helix idea is about, where universities do two things at the same time: they teach students and they work on new ideas. Researchers like Etzkowitz and Leydesdorff talked about this in 2008 (Etzkowitz, 2008; Etzkowitz and Leydesdorff, 2025). But this study adds something it shows that the government plays a big role in making sure these partnerships work.

One way the government does this is by using performance-based funding. This means that universities get money based on how they work with companies. The government says that if universities want money they have to show that they are working with companies. This is what the OECD said in 2019 (OECD, 2019). It is a way of making sure that universities are doing what they are supposed to be doing (Lim, 2016; Marginson, 2016). It is interesting that the Korean way of doing things is not about the government being in control. It is more about finding a balance between letting universities make their decisions and giving them direction. This is what some researchers like Kim said in 2004 (Kim, 2004). The government is not telling universities what to do. It is creating an environment where they can work together with companies.

When we think about education this study shows that we need to have a plan, for working with companies. We cannot just have one or two partnerships. Expect everything to work out. The World Bank and the OECD said in 2020 and 2019 that if we want to have workers we need to have a coherent policy (World Bank, 2020; OECD, 2019). The Korean example shows that when the government has a plan it can make a big difference. Universities and companies can work together better. Students can get jobs more easily.

Nevertheless, we should consider the context. South Korea's strong industrial base, centralized policy planning and long-term development vision helped create conditions for making collaboration work. Some countries with emerging economies may not have the institutional capacity, which can limit how quickly they can copy this approach. When it comes to adapting policies, research shows that having a governance system and trusting

stakeholders is more important than just copying the structure of another country. This is something that Ismailov et al. In 2022. Rakhimov in 2023 have argued in their studies, on policy transfer (Ismailov et al., 2022; Rakhimov, 2023).

The discussion shows that what the state does has an impact on how well universities and industries work together to teach people technical skills. When the state gives money to projects makes rules requires students to do internships and sets up places for people to do research it all works together to create a system that connects education, new ideas and jobs. This way of doing things in South Korea is different from places where universities and industries do not work together as well. The Korean model can teach other countries a lot, about how to improve the way they teach technical skills.

4.1 Revisiting the Triple Helix Model: Evidence from South Korea

The Korean case is different from the usual Triple Helix model. This model says that universities, industry and government should work together in a way. In South Korea the government is in charge and makes most of the decisions (Etzkowitz and Leydesdorff, 2025). This shows that the Triple Helix model needs to be changed when it is used in countries that are still developing their industries. We should not think that universities, industry and government always interact with each other in the way. Instead, we should consider how much the government is involved in shaping how new ideas and products are created.

The study found that the government's policies are effective in making universities and industries work together and in training workers. However, when we look closely we can see that there are some problems with having the government in charge of everything. There are some issues, with this approach that can cause tension. The way universities get money can cause some problems. When universities get money based on how well they do they often focus on research that can be used in the world and on working with companies (Marginson, 2016; Lim, 2016). This can mean that they do not do much basic research.

University funding is based on how they do, which is a problem. University funding that is based on performance can make universities focus on applied research and working with companies, which can make them do fundamental research (Shin, 2012; Woo-Cumings, 1999). For example, this can happen when universities get money for doing research that companies can use. The rules that universities have to follow can also be a problem. Universities might start to feel like they are just training people for companies of being places where people can learn and discover new things. The rules can make it hard for universities to make their decisions. In Korea the government has a lot of control over universities (Kim, 1997; Park, 2014). This means that the universities are not really in charge of themselves. This is a problem because universities should be able to make their decisions.

University funding and the rules that universities have to follow can also make it harder for some universities to succeed (Cui and Li, 2022). When universities work together it can help some universities more than others. This can make it harder for universities that're not as good to catch up. The problem is that not all countries can do things the way. Some countries do not have the resources to make their universities work together like some other countries do.

So, university funding and the rules that universities have to follow can cause some problems. University funding can make universities focus on the things and the rules can make it hard for universities to be independent (OECD, 2019; Tukhtabayev, 2025). This means that universities have to make some choices about what is important, to them.

5. Conclusion

This study looked at how the state policy affects the way universities and industries work together in South Korea and how it helps people get jobs. The study found that when the state has a plan it helps universities teach things that are actually useful to industries. The state did a things to help universities and industries work together. They gave them money, made rules and created places where they could meet and work together. This helped people learn skills that they could actually use and get jobs. At the time the study showed that the state played a big role in making sure universities and industries worked together in a way that would last.

The study also found that when the state gets too involved it can be bad for universities because they do not have as much freedom to make their own decisions. The study in South Korea shows that it is important for the state to find a balance between helping universities and giving them freedom.

For countries that are still growing the important thing is not to copy what South Korea did but to think about what will work for them. Universities and industries can only work together well if the country has a system if the state makes consistent decisions and if universities can teach things that will help people get jobs in the future.

The next step is to do research, on how different countries make decisions and how that affects the way universities and industries work together in different situations.

Acknowledgement

The authors would like to express sincere appreciation to academic colleagues and higher education experts who provided valuable insights and constructive feedback during the development of this study. Their perspectives contributed significantly to refining the analytical framework and strengthening the policy interpretation presented in this paper.

The authors also acknowledge the publicly available policy documents and institutional reports that served as essential sources for the empirical analysis of industry-university collaboration mechanisms in South Korea.

Conflict of Interest

Authors declare that there is no conflict of interests regarding the publication of the paper.

Author Contribution

Conceptualized the study, developed the research design, conducted data analysis, and prepared the original manuscript draft: Tukhtabayev Mirzokhid Akhmadjanovich; **contributed to methodological refinement, statistical interpretation, and critical revision of the manuscript:** Ismoilov Temurbek Islomovich; **participated in data collection, policy document analysis, and assisted in structuring the empirical findings:** Atakhanov Khoshimjon Boymirzayevich; **contributed to literature review development, interpretation of results, and final manuscript editing:** Xidirov Ulugbek Xabibullaevich. All authors reviewed and approved the final version of the manuscript and agree to be accountable for all aspects of the work.

Appendix A: An Example

Policy Evaluation Matrix of State Instruments Supporting Industry-University Collaboration in South Korea.

Table A1 Policy evaluation matrix

Policy Instrument	Policy Type	Implementation Level	Collaboration Mechanism Influenced	Workforce Development Impact
Performance-Based Funding	Financial	National	Incentivizes university-industry projects	Increased employability rates
Mandatory Internship Regulation	Regulatory	Institutional/ Program	Structured industrial practice integration	Practical skill acquisition
University-Industry Cooperation Foundations (UICFs)	Institutional	University Governance	Formalized partnership coordination	Sustainable collaboration structures
Government R&D Grants	Financial	National/ Regional	Joint research initiatives	Applied innovation competencies
Accreditation Standards with Industry Input	Regulatory	National	Curriculum alignment mechanisms	Reduced skill mismatch
Innovation Cluster Development Programs	Financial/ Strategic	Regional	University-industry networking	Technical workforce upgrading
Technology Transfer Support Policies	Institutional	University	Applied research commercialization	Industry-ready graduates

Note: This matrix categorizes major state policy instruments according to their type, implementation level, and impact on collaboration sustainability and workforce development outcomes.

References

- Sun, J., Liu, X., & Cai, J. (2025). Intermediaries that facilitate university–industry research partnerships: A systematic literature review. *Journal of Business Research*, 194, 115365.
- Bowen, G. A. (2009). Document analysis as a qualitative research method. *Qualitative Research Journal*, 9(2), 27–40.
- Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative Research in Psychology*, 3(2), 77–101.
- Bulajeva, T., & Meškauskienė, A. (2026). Future-Oriented Global Drivers of Change in Education: From Industrial Revolutions to a New Social Contract—A Scoping Review. *Social Sciences*, 15(1), 38.
- Choi, S. (2015). University–industry cooperation and employment outcomes in Korea. *Asia Pacific Education Review*, 16(3), 389–401.
- Cui, Z., & Li, E. (2022). Industry–university–research cooperation and regional innovation performance. *Chinese Geographical Science*, 32(5), 915–930.
- Etzkowitz, H. (2008). *The triple helix: University–industry–government innovation in action*. Routledge.
- Etzkowitz H., Leydesdorff L. *Innovation and the Triple Helix //Scientometrics*. – 2025. – T. 130. – №. 6. – C. 3279-3291.
- Ismailov, T., Kadirov, D., & Tursunov, A. (2022). University–industry collaboration in post-Soviet economies. *Asian Education and Development Studies*, 11(4), 555–569.
- Karimov, A. (2020). Industry–education integration in Uzbekistan: Challenges and prospects. *Journal of Education and Practice*, 11(5), 45–52.
- Kim, L. (1997). *Imitation to innovation: The dynamics of Korea’s technological learning*. Harvard Business School Press.
- Kim, J. (2024). Higher education reform and governance in South Korea. *International Journal of Educational Development*, 109, 103105.
- Kwon, Y. (2011). The developmental history of labor education in South Korea. *International Journal of Educational Development*, 31(5), 524–531.
- Lee, D. H., Bae, Z. T., & Lee, J. (1991). Performance and adaptive roles of government-supported research institutes in South Korea. *World Development*, 19(10), 1421–1440.
- Lim, H. (2016). Governance reform in Korean higher education. *Asia Pacific Journal of Education*, 36(2), 223–238.
- Lundvall, B. Å. (1992). *National systems of innovation: Towards a theory of innovation and interactive learning*. Pinter Publishers.
- Marginson, S. (2016). High participation systems of higher education. *Higher Education*, 72(4), 413–434.
- Nelson, R. R. (1993). *National innovation systems: A comparative analysis*. Oxford University Press.
- OECD. (2019). *OECD reviews of innovation policy: Korea 2018*. OECD Publishing.
- Park, H. W. (2014). Transition from the triple helix to N-tuple helices? *Scientometrics*, 99(2), 561–571.
- Rakhimov, O. (2023). Policy mechanisms for higher education modernization in Central Asia. *European Journal of Education*, 58(2), 310–325.
- Shin, J. C. (2012). Higher education development in Korea. *Higher Education*, 64(1), 59–75.
- Suh, Y., Woo, C., Koh, J., & Jeon, J. (2019). Analysing satisfaction of university–industry cooperation and its performance. *Technological Forecasting and Social Change*, 148, 119740.
- Tukhtabayev, M. A. (2025). Opportunities for Uzbekistan to introduce industrial and educational cooperation based on the experience of South Korea. *Journal of Science, Research and Development*, 2(10), 87–91.
- Woo-Cumings, M. (1999). *The developmental state*. Cornell University Press.
- World Bank. (2020). *World development report 2020: Trading for development in the age of global value chains*. World Bank.
- Yang, W., & Chen, W. (2026). A configurational exploration of how organizational characteristics and multidimensional proximities influence university–industry collaborations. *The Journal of Technology Transfer*, 51(1), 344–372.
- Yin, R. K. (2018). *Case study research and applications: Design and methods (6th ed.)*. Sage Publications.

- Yun, J. J., Zhao, X., & Pyka, A. (2025). Open innovation and digital transformation in South Korea. *European Journal of Innovation Management*.
- Yusupov, B. (2021). Technical education reforms in Central Asia: Bridging skills and industry needs. *Central Asian Journal of Education*, 6(2), 77–89.
- Abduvaliev, S. (2022). Workforce development and vocational training systems in Uzbekistan. *International Journal of Training Research*, 20(3), 210–225.