SIBR Conference on Interdisciplinary Business & Economics Research

June 30 - July 1, 2022, Osaka

PROCEEDINGS

Volume 11 (2022)

Issue 3 (July)

ISSN: 2223-5078

Online version: http://sibresearch.org/past-2022-osaka.html
(password: sibr@osaka@2022)

SIBR Society of Interdisciplinary Business Research

SIBR 2022 CONFERENCE ON INTERDISCIPLINARY BUSINESS & ECONOMICS RESEARCH

June 30 – July 1, 2022

Osaka, Japan

Market Recovery or Uncertainty?

Theories and Methodologies Across Disciplines

Conference Proceedings

Volume 11 (2022), Issue 3

ISSN: 2223-5078

Online version: http://sibresearch.org/past-2022-osaka.html
(password: sibr@osaka@2022)

Published by Society of Interdisciplinary Business Research, 2022, Volume 11(3)
Papers published in this proceedings have been double-blind peer reviewed

Table of Content

Published by Society of Interdisciplinary Business Research, 2022, Volume 11(3)
Papers published in this proceedings have been double-blind peer reviewed

Managing University-Industry Partnerships: A Literature Review

Lina Anatan*
Faculty of Business, Maranatha Christian University
lina.anatan@eco.maranatha.edu

Nur
Faculty of Business, Maranatha Christian University
nur@eco.maranatha.edu

Presented at: SIBR 2022 (Osaka) Conference on Interdisciplinary Business and Economics Research, 30th June – 1st July 2022, Osaka, Japan.

ABSTRACT

The university-industry partnership is an interesting issue to study considering the important role of the university and industry in strengthening the Indonesian economy. Even though many regulations and strategies have been formulated by the Government to increase university-industry partnerships, the partnership is still considered low in Indonesia due to differences in vision, mission, and culture or way of communication which often trigger conflicts of interest between both parties. This paper is a literature review that discusses how to manage university-industry partnerships. The discussion will begin with the development of inter-organizational partnerships in the strategic management literature and why the university-industry partnerships are important to strengthen the competitiveness of both parties involved in the partnerships, particularly the partnership with micro, small, and medium enterprises (MSME). The discussion will continue to focus on issues and inhibiting factors within university-industry partnerships that can trigger barriers to partnerships, conflicts of interest within university-industry partnerships, and how to manage the conflict. The discussion will end with lesson learned from South Korea. This literature review is expected to contribute to the development of literature in the field of strategic management in general and strategic alliances in particular. This paper is also expected to provide knowledge for the decision makers regarding strategic alliances so that the partnership can be managed properly and may have a positive impact on improving the performance of both parties involved in the partnership.

Keywords: university-industry partnership, conflict of interest, key success factors, MSME

INTRODUCTION

An inter-organizational partnership is an important issue in a very dynamic and unpredictable business environment and competition. Through partnerships, organizations can overcome the main problems related to limitations in resource ownership, both tangible and intangible. The conceptual and empirical literature in the field of strategic management has long discussed the importance of inter-organizational partnerships. Even though it is not a new phenomenon, inter-organizational partnerships remain an interesting trending issue to discuss. A partnership is an important strategy for organizations to win the competition, not only partnerships with other organizations in the same industry, but also in different industries, or even with competitors (Hamel et al., 1989). Through partnerships, organizations

can gain various benefits such as accessing resources, knowledge, and skills that they do not have. In other words, partnerships are motivated by the need to access resources, core competencies, innovative skills, and specific knowledge possessed by partners (Kogut & Zander, 1992).

As an example, MSME in Indonesia are currently still dealing with several internal problems so that the level of resilience and competitiveness, especially in the new normal era characterized by the low touch economy era, is still considerate low. These internal problems include the low level of digital literacy, management problems related to limited managerial skills and business management, lack of capital, and low mastery of technology (Abdurohim, 2021). These problems arise due to limited resources, knowledge, and skills possessed by MSME. To be able to overcome these problems, MSME may establish a partnership with other parties such as banks to gain access to capital; other MSME or companies and universities to gain knowledge and skills that may be needed but are not owned by MSME. Knowledge transfer activities from universities to MSME within university-MSME (industry) partnerships may become the best alternative solution to overcome the problem. Knowledge transfer can be conducted through various mechanisms such as providing training and technical guidance by academics from universities related to the application of digital marketing, training on business and organizational management, training on personal financial management and business finance, as well as knowledge and other technical guidance related to other functional areas. such as operations and human resources.

University-industry partnerships provide means for sharing tacit and explicit knowledge between university and industry. Universities, as a source of knowledge providers, have an important role in providing experts according to certain fields of knowledge that are needed in the partnership. In addition, the university is also responsible for providing capital such as expertise, physical resources, access to knowledge resources in form of information databases, and intellectual networks that can be utilized by partners in finding solutions to problems faced in the industrial sector. Through its contribution, it is expected that universities can strengthen their role in improving the national economy (Cervantes, 2017).

On the other hand, the industry as a source of funding might support research activities and create opportunities for practical use or application orientation. In addition, the industry also contributes to the development of higher education curriculum so that universities can provide qualified and competent graduates according to industrial needs (Awasthy, 2020. Through the partnership, it is expected that the partnership will provide a significant contribution to both parties involved. However, it cannot be denied that the partnerships are often faced with several inhibiting factors such as issues related to the university and industry differences in terms of communication, mission and vision, culture, and trust (de Vries et al., 2018). To be able to manage issues of differences that exist and possible conflicts of interest in the partnership, understanding and managing these issues is required at every stage of the partnership.

Sonnenwald (2007) classified the stages of university-industry partnerships into the foundation, formulation, sustainment, and conclusion stage that developed as a platform to understand the complexities of university-industry partnerships. Those stages are dynamic processes that are influenced by internal and external factors and require many changes through adjustments to the dynamics. For example, at the foundation stage, there are factors that need to consider such as socio-economic factors. The socio-economic factor is related to the awareness of the parties who work together to gain economic or financial benefits from the partnerships that developed through research and development. In terms of the long-term partnership, financial risk-sharing also can be done within the university-industry partnership. Through the partnership, companies may access local markets, motivate their employee, provide access to services and researchers, and employee selection purposes.

The formulation stage begins with the emergence of ideas and research planning activities. It is necessary to consider several things that include the determinants of universities-industry partnership success, since in the partnership many researchers and practitioners are involved, each of whom has a different disciplinary background, works at different institutions, and has a different planning pattern. The successful partnership appears at the conclusion stage which is the final stage, even though it is also possible that funds and other resources might just end up with no result.

When the partnership is established challenges may arise from differences such as research objectives, realistic assignments, timely completion of assignments, ethical practices, and the possibility of mutual distrust. Differences between academics (university) and practitioners (industry) may arise in terms of achieving research goals that academics want in the long term whereas business requires more pragmatic and company's goals oriented that directly contribute to the development of products, services, and management practices. To manage and overcome existing differences, sharing information on research budgets, ensuring that each party receives the same benefits from the partnerships, developing principles and ensuring that there are differences in resources owned is needed.

This paper is a literature review that aims to discuss the management of university and industrial partnerships, specifically micro, small and medium enterprises (MSME). The discussion is organized as follows: the discussion begins with issues in the management of university and industry partnerships to explain the phenomena. The next discussion focuses on the reasons for the importance of university and industry partnerships for both parties, university and industry involved in the partnership, important issues in managing university and industry partnerships, inhibiting factors in managing university and industry partnerships, the issue of conflicts of interest in university and industry partnership and how to manage the conflict,. The discussion will end with lesson learned from South Korea. This paper is expected to contribute to the development of literature related to strategic alliances and input and knowledge for decision makers in related fields.

THE IMPORTANCE OF UNIVERSITY-INDUSTRY PARTNERSHIPS

As discussed in the background section, the motivation for an organization to enter into partnerships is to gain access to resources, core competencies, and specific knowledge that are not owned by the organization and can be accessed from outside the organization. The same as university-industry partnerships. University as a source of knowledge cannot be underestimated since universities are required to always upgrade skills and knowledge to be transferred to industry. The university acts as a catalyst not only in improving industrial performance and competitiveness through innovative ideas that can be applied in industry but also as a catalyst for economic growth.

The university's important roles include: 1) the university provides input for the industrial innovation process not only in terms of developing knowledge and skills of human resources, but also creative ideas in product and process innovation that can be developed through knowledge transfer activities from the university. to industry within university-industry partnerships, 2) university may have an important role through scientific research to produce outcomes that can be applied in industrial production processes, such as prototype development or new process strategies (Schartinger et al., 2002).

The university-industry partnership is an important channel in efforts to strengthen the university's ability to produce high-quality and relevant research to be applied in solving industrial problems. Thus, the capability of the industry to increase competitiveness and achieve competitive advantage can be increased. It is undeniable that the strength of the university lies based on knowledge, while the industry has the strength in terms of technology development and funding. So that if these two parties work together, it is expected to provide

significant results for improving the performance and competitiveness of both parties in their respective industries.

Anatan (2017) stated that university-industry partnerships will provide benefits not only for both university and industry, but also the society. Benefits for university can be identified as follows: 1) Obtaining research funding, patents, and licenses that can be generated from the commercialization process of academic research results, 2) Increasing university knowledge of the business world so that it can provide value-added to academic knowledge, 3) increasing understanding of practices in the business sector so that cross-pollination ideas between university and industry can be developed in line with the university's strategic agenda, 4) Increasing opportunities for university to utilize technology and equipment that may not be available in university laboratories. This experience will be a privilege for the university in strengthening research capabilities and as a capital to be able to attract competent and qualified students, 5) Through partnerships, universities have increased opportunities for the absorption of graduates in the industrial world, both for undergraduate and postgraduate students.

For industry, university-industry partnerships will also provide benefits including 1) Encouraging the improvement of research and development programs that are important for product and process innovation to improve industrial competitiveness, 2) Researchers from university can provide input on current research issues that are useful for the development of industrial product or service, 3) Regarding technology development, partnerships with universities will provide access to various research ideas, effectiveness of technology development, efficiency in the development cycle time, and competency development in non-technological skills, 4) Industry will benefit from the development of human resources which can be achieved by providing training opportunities for potential workers, recruiting the right employees, and conforming the university curriculum to industry needs, 5) In terms of access to experts and facilities, the industry will benefit from the university's explicit and tacit knowledge transfer process, so that the active workforce can complement the company's resources. 6) In terms of risk management, partnerships with universities will provide solutions to align the technological trajectory with market needs.

Santoro and Chakrabarti (1999) suggest that university-industry partnerships will not only enhance the reputation of both parties involved but also provide benefits to society. These benefits can be felt, for example, related to university research sponsored by industry, which tends to be applied research for practical application in the business world. The application can be in terms of development or improvement in medical equipment, therapy, technical development of energy efficiency, or innovative products related to electronic technology such as laptops, gadgets, etc.. Table 1 summarizes the benefits of university-industry partnerships.

According to Santoro and Chakrabarti (1999), university-industry partnerships have four main benefits. First, universities can obtain research and patent funding as well as licenses from collaboration with industry. This funding is an alternative source of funding in addition to the funding from the Government or other organizations from abroad. Second, universities acquire knowledge related to business practices. Through collaboration with industry, universities gain benefits such as the availability of internships for students to learn from the business world, conducting final research projects, to providing employment opportunities after the students graduate from pursuing higher education. Third, through the partnership, the university might obtain inputs and insights in developing curriculum that in accordance with the industry needs, for example relating to the development of students soft skills since they were in college, developing critical thinking abilities and preparing students to be ready to join the industry. Fourth, universities have the opportunity to get facilities to utilize

technology and equipment owned by industry, to develop innovative ideas according to industry needs so that the main role of universities in industry can be realized.

Table 1. The Benefit of University-Industry Partnerships

	Benefit
University	Research funding, patents, and licenses Knowledge of business practices Cross-pollination ideas that are in line with the university strategic agenda Utilizing technology and equipment from the industry
Industry	Improvement of research and development programs The development of a product or service based on current issues Access to various research ideas, effectiveness of technology development, efficiency in the development cycle time, and competency development Development of human resources Access to experts and facilities Risk management
Society	Technology development application

Source: Author Elaboration

The benefits of university-industry partnerships for industry include improving research and development programs. It is undeniable that research and development activities are important activities for the industry to develop and create a company's competitive advantage but require a fairly high cost. Partnerships with universities provide benefits for industry to gain access to experts and researchers who will assist them in developing innovative ideas related to the product and service development according to current market needs. Industry will also have the privilege of accessing various research ideas and the effectiveness of technology development to support the achievement of efficiencies in the product life cycles development and company competencies. In addition, other benefits such as the development of natural resources both in terms of knowledge, skills, and competencies, to risk management can be carried out together in a partnership.

The university-industry partnership not only provides benefits for both parties who work together but also for the community through the implementation of technology development. For example, universities and industry work together to generate innovative ideas in product and process development through basic research for laboratory purposes, these ideas are developed for commercial purposes and used by the community at large, it will provide benefits for meeting community needs.

Likewise, the partnership that occurs between universities and MSME, on the one hand, universities as knowledge producing institutions have the opportunity to play a role in fostering and developing MSME through knowledge transfer activities to MSME, on the other hand MSME can gain benefits in the form of access to resources that are not owned by MSMEs. For example, the main internal problem faced by MSME is the lack of competence of human resources in managing the organization, and managing functional areas within the company. By building partnerships with universities, MSME will be able to have the privilege of accessing knowledge from universities through activities such as training and development, technical guidance, coaching, and business assistance.

Another idea related to university-MSME partnerships might be done through plans to develop the MSME community and other related institutions. Anatan and Nur (2020) developed an idea for a computer-based application that aims to build a community and accommodate MSME, suppliers, consumers, academics, and other related institutions such as

the government and banking institutions. Through this community, MSME get the opportunity not only to build cooperation networks but also as a medium to be able to access various information related to MSME business development from the encyclopedia menu that was developed.

ISSUES IN UNIVERSITY-INDUSTRY PARTNERSHIPS

Universities and industry are two kind of organizations that have quite significant different backgrounds, it is not uncommon for these differences to trigger disputes or conflicts of interest. Significant differences in vision, mission, and work culture between universities and industry. For example, related to vision and mission, as producers of knowledge, universities tend to have the desire and purpose to develop innovative ideas and share them for consumption and use by the public, while the industry is the opposite. Creative and innovative ideas generated by the industry tend to use to be stored as a source of competitive advantage.

Table 2. summarized issues within the university-industry partnership and the difference between university and industry in terms of communication, mission, cultural, institutional, operational, and trust issue. Communication is the main obstacle to realizing a sustainable partnership due to the different communication skills and capabilities between university and industry. The needs and expectations of both parties are also often different, and there are often mistakes in communicating each other's willingness and requirements which might lead to more complex problems. Each party also often has stereotyped visions that might hinder communication and the effective completion of collaborative projects. Kopczynska and Ferreira (2017) conducted a study to fill gaps in research related to communication between universities and industry. The results of their study recommend that to improve communication problems, both parties involved in the partnership need to systematize and categorize communication support equipment between collaborating parties.

Table 2. Issues, Differences, and Similarity

Issues	University	Industry
Communication	To disseminate	To conceal
Mission	Basic research Publication	Applied Research Economic Result
Cultural	Disclosure the research result for academic career and recognition	Protect the research result for company's competitive advantage and financial return
Institutional	Reward System: Peer recognition and reputation Organization of work: High level of freedom, lower income	Reward System: Financial return Organization of work: Low level of freedom, higher income
Operational	Abstract, ambiguous, and complex language	Goal-oriented and concise
Fear and trust	legal issues and contract negotiations	

Source: Author's Elaboration

Universities are often considered to have a dual mission, especially when they decide to develop "start up companies." which shows the credibility of the university as a service provider institution in terms of education, teaching, research, as well as community services, however. in the end might lead to a dual mission that may cause problems in managing cooperation with industrial partners (Compagnuccia & Spigarelli, 2020). Cultural differences

are also one of the main factors hindering collaboration. The main difference is seen in the main goals or objectives of both parties, where the university as an educational institution is non-profit oriented while the industry is profit-oriented (Moris & Hunt, 2007). Likewise with the dissemination of knowledge.

Universities as educational institutions and research centers to create and develop new ideas, have the desire and obligation to publish and disseminate their findings through research conducted. On the other hand, companies are more likely to be secretive and hide the results of their research on the grounds of competitive advantage and profit. This fundamental difference is still a major problem and reconciliation of agreements in partnership between universities and industry (Villani, 2013). In other words, the university's objective to collaborate with industry is due to basic research for publications while university objective is applied research for an economic result. In term of motivation, university's motivation is to disclosure the research result for academic career development and recognition, while industry result is to protect the research result for company's competitive advantage and financial return.

In terms of institutional difference, the reward system for academics in universities is based on peer recognition and reputation. Academics tend to enjoy a high level of freedom even though they receive lower income. While in industry, the reward system is based on financial return. In contrast with academics, industrial researchers tend to enjoy a low level of freedom to get a high level of income. University and industry also have the difference in terms of their operational difference. Universities tend to used abstract, ambiguous, and complex language, while the industry is more goal oriented and concise (Villani, 2013).

Factors of fear and trust might also be a barrier to successful university-industry partnerships. Significant differences both in terms of culture, experience, and stereotyped vision, often feel afraid to develop cooperative relationships with each other. Lack of trust due to the existing differences is an obstacle to the creation of an effective partnership (Bstieler et al., 2014). This is often about legal issues and contract negotiations. For this reason, it is necessary to determine who is the key person responsible for the established cooperation.

INHIBITING FACTORS WITHIN UNIVERSITY-INDUSTRY PARTNERSHIPS

Universities and industries have a different mission and when it does not properly manage will further widen the gap between industry and university. This section discusses many obstacles that might create problems within university-industry partnerships. James J. Casey, Jr., Executive Director, Office of the sponsored program, Cardinal State University identified several inhibiting factors within university and industry alliance based on NCURA (National Council of University Research Administration) Annual Meeting 2003. Table 3 summarized inhibiting factors within university-industry partnerships.

The first factor, communication is a major obstacle to sustainable alliances. Communication skills and capabilities between universities and industries are different, the needs and expectations of both parties are also often different. Therefore, when there is miscommunication, it will arise a complex problem. This condition is often exacerbated by the fact that each party has a stereotype of vision that can impede communication and effective project completion of cooperation. Lack of communication between both parties from different levels of the organization, such as between the faculty and admission within the university can also hinder the creation of effective partnerships.

The second factor, universities have a "mixed mission", especially when they decided to develop "start-up companies." The development of start-up companies indeed shows the real credibility of the university as a service provider institution in terms of education, teaching, research, and services to the community and industry, however in the end it can lead to a

"mixed mission" which can cause problems in the management of cooperation with industrial partners. The third factor, is cultural differences. Cultural differences are a major barrier to partnerships. The main difference is seen in the main objectives of both parties, where the university as an educational institution is non-profit oriented, while the industry is profit-oriented.

Table 3. Inhibiting Factors Within University-Industry Partnerships

No.	Inhibiting Factors
1	Communication problem
2	Universities have a "mixed mission",
3	cultural differences.
4	Knowledge dissemination
5	The fear factor
6	Lack of trust due to existing differences
7	The university often overestimates the technology or research results
8	Financial risk for the university
9	The university is less consistent
10	Too much specialization in contract negotiations

Source: Author’s Elaboration

The fourth factor is knowledge dissemination. Universities as educational institutions and research centers to create and develop new ideas have the desire and obligation to publish and disseminate their findings through their research outcomes, Conversely, companies are more likely to be closed and hide their research results on the grounds of competitive advantage and profit. This fundamental difference is still a major problem and reconciliation of agreement in collaboration between universities and industry. The fifth factor is the fear factor. Both parties have real differences in terms of culture, experience, vision stereotypes, often feel afraid to develop a cooperative relationship between each other.

The sixth factor, the lack of trust due to existing differences, is an obstacle to the creation of an effective alliance. This is often the case, especially concerning to legal issues and contract negotiations. For this reason, it is necessary to determine who is the key person responsible for the established cooperation. The seventh factor, universities overestimate the technology or research results they create or produce. This opinion often arises and is expressed by industry parties who feel that universities are often "overvalued" for the results of the projects they are working on. Therefore it is necessary to make an agreement that is determined on a case by case basis.

The eighth factor, is financial risk for the university. For universities, it will be risker to collaborate with industries that are profit-oriented compared to the government. The government provides a guarantee of stable research funding since the decisions or budgets set do not depend on the profits conditions received and determined by market conditions. This is in stark contrast to the industry whose financial condition and income are strongly influenced by market share. In a sluggish economic condition and "fiscal distress" occurs, it could be a cut or termination of the research budget which fails of project completion.

The ninth factor, the university is less consistent. Basically, the university is an organization that is "fluid" and "flexible." The administration and management can come and go, even if the manager stays the agenda may change making it difficult to develop long-term partnerships or collaborations. In terms of building relationships, companies in the industrial sector tend to want to build exclusive relationships but universities don't.

The tenth factor, is too many specializations in contract negotiations. For example, the management of the technology or knowledge demands intellectual property rights or licensing and the sponsors demand a provision or the results of their work. The industry also has its own problems where different business units have different responsibilities in terms of research agreements and intellectual agreements. property so that it becomes an obstacle from the industrial side. This problem will be more complex with the personal turnover involved, poor communication, and changes in work agendas on both sides.

CONFLICT OF INTEREST WITHIN UNIVERSITY-INDUSTRY PARTNERSHIPS

University-industry partnerships began to increase in the 1980s. In the partnership process, companies provide sponsorship of research conducted at academic institutions, whereas academic institutions provide resources to help researchers to develop start-up companies. Human resources from the university act as consultants who organize and lead the implementation of research activities planned in the partnerships. Even though the issue of partnerships between the two institutions with different backgrounds in vision, mission, and work culture has been going on for a long time, the differences in mission and work culture between universities and industry has resulted in frequent conflicts of interest between university and industry that may hinder the effectiveness of the partnership for both parties.

Conflict of interest is defined as a situation where one of the parties has the opportunity to influence the direction of research and business decisions in a way or action that can lead to a unilateral advantage (Resnik & Shamoo, 2002). There are differences in academic norms and industrial practices that trigger ethical problems in university and industry alliances that influence the emergence of conflicts of interest between both parties involved in the partnerships. Table 4 discusses the different academic norms and industry practices that can trigger conflict in university-industry partnerships.

Academics tend to report data and results honestly, there is openness in terms of sharing ideas, data, technology, and resources, have high objectivity in following methods and procedures that can reduce the impact of financial, personal, political, cultural, or biased other. Academics also have the freedom that allows individuals to speak and write about the results of the investigation as long as they do not harm others, since academics knowledge is used for public purposes which in turn may provide benefits for the advancement of economic growth. On the other hand, in industrial practice, there is a tendency to distort data or results for profit, only to publish data that is profitable for the company. The industry places more emphasis on confidentiality to protect intellectual property and tends to refuse to share information. Industry practices tend to be biased, following procedures and methods that tend to promote interest in the company. There is a centralized control where the company can control what investigation results are written or conveyed orally. Knowledge in industrial practice tends to be developed for commercialization purposes (Contreras & Rinehart, 2019)

Table 4. Academic Norms vs. Industrial Practices

Academic Norms	Industrial Practices
Honesty	Deception
Openness	Confidentiality
Objectivity	Bias
Academic Freedom	Centralized Control
Knowledge for its own sake	Knowledge for the sake of commercial application.

Source: Author’s Elaboration

Conflict is normally occurred in a partnership, especially within the university-industry partnership that has different objectives and backgrounds. When there is an increase in conflict, it is important for the university and industry to manage the conflict. In conflict management, both parties are responsible to manage conflict in the partnership. Claudia Farber in her presentation material at The State University of New Jersey on "Conflict of Interest, Conflict of Commitment in Collaborative Work" describes several types of conflicts that may occur in partnership between universities and industry. Some of these types of conflicts include: financial, commitment, conscience, inappropriate use of institutional resources, peer review, unintentional bias, and conflicts in research such as bias in research design, implementation, data analysis, and reporting of research results. All of which have an impact on the inaccuracy of research protection.

Financial conflicts are related to perceived and actual tensions between personal financial benefits and honesty, accuracy, efficiency, and objectivity. It is actually natural, as stated in the Bay-Dole Act (1980) regarding the partnership and commercialization of research ideas, especially in technology transfer by giving ownership to research institutions, however, the need for commercial success puts pressure on researchers to produce results in copyright.

Commitment conflicts within university-industry partnerships occur when there is a situation where researchers dedicate more time and effort to activities outside the research activities within the partnership, thereby interfering with his primary obligations. It will result in conflicts not only in research obligations but also in teaching, administrative, and public services, for example in the case of involving students in a project for the personal benefit of the researcher, or a condition where the researcher accepts a strategic position as a Board of Advisor in the sponsoring company for their research.

Another problem arises in collaborative research, where there are groups of researchers all members have unequal qualifications. The use of technology is to facilitate communication, funding sources to support collaboration and multidisciplinary projects, and the demand for tangible evidence that can improve and support progress is needed to create effective and efficient collaboration. In a collaborative research situation, conflicts are possible due to complex roles and responsibilities and differences in work culture, so intensive management is needed to prevent prolonged conflicts and have a negative impact on the performance of the alliance itself.

To overcome the possible negative impact of conflicts that arise in university and industry partnership, openness, and consultation with partners is needed. Intensive communication, obvious formulations and definitions are also needed regarding the various issues involved in the partnership like the goals, expectations, roles, obligations, and accountability of each party.

Patil (2012) suggests that to prevent conflicts of interest between academia and industry, several principles must be considered. For example, from a financial perspective, every agreement in a partnership must be transparent, both in terms of clarity of contributions and rewards, as well as clarity in independent verification. From the perspective of personal integrity, there needs to be clarity governing ethical principles, and respect for intellectual property rights. To overcome these problems, Patil (2012) suggests the need for guarantees that there will be no influence in the selection and interpretation of data, there is a guarantee of quality control and clear studies must be applied through clear experimental methods, as well as data access and participation in analysis and presentation.

UNIVERSITY-INDUSTRY PARTNERSHIP: LESSON LEARNED FROM SOUTH KOREA

The rapid development of the role of university-industry partnerships in South Korea began in 1988 after the "venture-company boom." Researchers at universities have become interested in getting involved in profit-business and public understanding of knowledge transfer activities has changed so that various organizations are born that support university and industry alliance activities. Through university and industry partnerships, academics obtain funding to finance research that will be used and bring benefits to solving problems in industry. Funding obtained by universities is classified under funding from governments, public organizations, private companies, and private organizations

Research funded by public organizations such as the Academic Promotion Foundation and The Science Foundation has research characteristics based on high academic curiosity. Partnership between universities and industry provides an opportunity to strengthen corporate innovation, especially in small and medium-sized companies. Interest in cooperation with universities is strongly influenced by the size of the company. The larger the size of the company, the higher the tendency of interest to cooperate with universities. In this condition, the company's strategic planning becomes an important factor in supporting the continuity of cooperation between universities and industry. The company's strategic planning is particularly related to interchanging information and joint-participation in government research projects. Meanwhile, small-scale companies have less interest in establishing cooperation with universities due to limited resources. This can be explained in conditions where the human resources involved in the company have a higher education background will have an interest in building partnerships with universities, however for companies that have human resources, for example superiors with a low educational background will have a cynical reaction to collaborative efforts with universities.

The paradigm shift in the knowledge-based economy is a challenge for universities as institutions that play an important role in generating knowledge. It demands the need for the role of universities that are rooted in science and develop this knowledge intensively by involving themselves in efforts to build a national innovation system to achieve the goal of increasing national competitiveness and creating personal welfare for the community. The success of innovation is strongly influenced by the creation of new ideas and new knowledge with the university as a source of wealth that has ideas and knowledge. The university also acts as a supplier of technology needed by industry, what industry needs is technology with few barriers in the technology transfer process that is important in activating the technology.

To support activities in the university-industry partnerships, all universities in Korea have research centers and manage research funding both internally and externally, such as the establishment of Region Technology Innovation Centers (TIC), Techno Park (TP), Region Research Center (PRC), Superb Research Center (SRC/ERC), Business Incubation (BI), Info-telecom Business Support Centers, Industry-Academia Research Consotium Centers, University Technology Transfer Center, The Small-Medium Business Cooperation Group and so on. These institutions are established, managed, and sponsored by the Ministry of Technology Transfer Center, the Ministry of Information and Communication, and the Ministry of Science and Technology. These institutions were formed to manage partnership contracts between universities and industry and implement them. With the support of these institutions the creation in South Korea increased sharply. Seoul National University produced 260 patents in 2004, while Kyungbook National University produced 36 patents. Previously until May 2001, the patents of all universities in South Korea only reached 44.

In the early 1960s, industrialization in Korea began, which was rooted in the processing of iron ore, tungsten and silk raw materials which did not have high added value. In the

1980s-1990s, starting the second period of industrialization which was marked by the accumulation of capital and the level of mastery of technology, it was possible to support the absorption and development of higher technology supported by the high competitiveness of the petrochemical, shipping, automotive and construction industries and became the main driver of the national economy. The South Korean government has begun to encourage the role of research universities intensively as one of the key factors in the development of the national economy in this second industrialization period.

Professor Hwa-Cho Yi in his working paper entitled "Korean experience in fostering university-industry partnership" stated that in South Korea, several ministries are responsible for managing partnerships between universities and industry. These ministries include: Ministry of Education, Ministry of Human Resources, Ministry of Commerce, Ministry of Industry and Energy, Ministry of Science and Technology Education, Ministry of Small and Medium Business Administration, and the Korean Intellectual Property Rights Office. The main task of the ministry is to support collaboration between universities and industry and encourage technology transfer activities.

To support the work of the ministry, cooperation offices were established including: University-Industry Cooperation Agency, Cooperative excellent universities support, local industry based colleges support, regional Technology Innovation Center (TIC), Techno Park (TP), Research result Spreading Business, Regional Research Center (PRC), Excellence Research Center (SRC/ERC), Business Incubation Center (BI), University Technology Transfer Center as centers managed by government organizations that promote policies to enable collaboration between universities and industry. There are other ministries such as the Ministry of Information and Communication, the Ministry of Environment, and the Ministry of Gender Equality as ministries that support specific fields related to the ministries that are specifically responsible for managing collaboration between universities and industry.

Management at the organizational level were also formed such as the University IT Research Center, IT Starting Business Support Center, Environmental Technology Development Centers, Female College Student Career Development Centers as projects managed by these ministries and constitute a system that supports specific fields. associated with their own ministries. In its development, there are various types of organizations formed related to university and industry cooperation and technology transfer which it is impossible for all these ministries to handle efficiently. To overcome this problem, the Ministry of Education and Human Resources, which is in charge of universities, needs to improve regulations and encourage the University and Industry Cooperation Agency to give important points to technology transfer and cooperation activities.

There are four laws that specifically regulate collaboration between universities and industry and the research results that result from this partnerships. These laws include: The Science Technology Basic Law, Technology Transfer Promotion Law, The Patent Law, and the Law for Industrial Education promotion and Co-operation Boost. Science Technology basic Law aims to plan the development of the national economy, further contribute to the development of the quality of life of the people by developing the basis of science and technology, innovation of knowledge and technology, and strengthening national competitiveness. The Technology Transfer Promotion Law was developed to encourage organizations to engage in technology transfer activities based on the law on higher education, encourage research and development activities within organizations and support self-management systems and income-use.

The Patent Law discusses laws governing the promotion of education in industry and encourages partnership between the two parties. Since each organization promotes university and industry partnership separately with university research centers, the synergistic effect of partnership between universities and industry alone is not sufficient. The government needs

to establish a legal institutional base to enable partnership between universities, industry and government through investment in research centers to develop national innovation systems with the aim of creating, sharing and disseminating new knowledge and technologies.

The South Korean government developed a three-stage periodization of government policies to support university-industry partnerships. The years 1963-1997 began in the early stages which were marked by the birth of policies such as the Industrial Education and Industrial-Academic Cooperation Promotion Act in 1963 which emphasized the education and training aspects to support the availability of industrial workers. Several national research projects were introduced in 1982. Along with economic growth and the increasing stage of industrialization in the second period (1998-2003) the South Korean government issued a series of incentive mechanisms and infrastructure development to encourage university-industry partnerships in research activities both to support the system national and regional industrial innovation. There are three government policies that have a direct impact on the formation of a tripartite cooperation system between the government, industry, and universities. The collaboration includes reform of higher education incentive mechanisms, system development and supporting infrastructure, and research competency development.

Incentive programs for R&D activities and the development of university human resources are provided to realize the reform of the university's incentive mechanism by providing various university and industry partnership patterns that include cooperation with small and medium enterprises through Kibo Technology Funds. Reform of the system for evaluating the capacity of teaching staff at universities is carried out by highlighting the amount of research funding, patents and collaboration with companies. The incentives provided support scientific publications in international journals and open opportunities to provide business collaboration facilities that involve teaching staff in business activities.

Government policies in the development of systems and supporting infrastructure include the development of industrial areas that are integrated with the development of industrial human resources. This policy is carried out under the National Science and Technology Council. This institution was founded in 1999, led directly by the president, and is the highest institution in strategic technology planning and development at the national level. Research and industrial cluster infrastructure is built in the form of the Science Park Development Program, the Techno Park Building Program and the Industrial Complex Innovation Cluster Program, and the construction of public research institutions and research-based universities, such as KAIST (Korea Advanced Institute of Science and Technology).

Evaluation of the number of articles published and institutional collaboration between universities and companies are carried out to improve academic competence in the fields of education and research. The NURI project is a real example of a project that was formed in 2004-2008 to create a synergy between the development of university competency specializations with the needs of industries and aims to grow the top 10 research-oriented universities in several core fields, encouraging universities in South Korea to entered in the top 10 of SCI journal publications, and became one of the 10 largest countries in terms of technology transfer from universities to industry, from 10% in 2004 to 20% in 2012.

CONCLUSIONS

The management of the university and industrial partnerships is inseparable from the problem of conflicts of interest. Managing conflicts of interest require professional resolution and the responsibility of all parties involved to act appropriately. When a conflict of interest occurs, all parties involved in the partnership are responsible for disclosing the conflict of interest and complying with all management plans developed to manage and resolve conflicts of interest that occur. The first step needed is to identify conflicts of interest since often the type

of conflict of interest that occurs is not clear and not always for profit reasons but also to avoid risk or loss. After identifying the conflict, it is necessary to consider several choices of appropriate strategies to manage the conflict of interest including removal, restriction, engaging, or relinquishing. Managing university and industry partnerships needs to pay attention to several aspects other than conflicts of interest, related issues, and inhibiting factors that will affect the success of university-industrial partnerships.

ACKNOWLEDGMENTS

We gratefully appreciate The National Research and Innovation Agency, Republic of Indonesia for the research grant provided through Penelitian Dasar Unggulan Perguruan Tinggi (PDUPT) Scheme. We also would like to thank Yayasan Perguruan Tinggi Kristen Maranatha (YPTKM) and Lembaga Penelitian dan Pengabdian Masyarakat (LPPM) Maranatha Christian University for the support.

References

Anatan, L., 2017. Knowledge transfer within university and industry alliance. *Doctoral Dissertation*. Gadjah Mada University Yogyakarta.

Awasthy, R., Flint, S., Sankarnarayana, R., & Jones, R.L., 2020. A framework to improve university–industry collaboration. *Journal of Industry-University Collaboration*, 2 (1), 49-62

Bstieler, L., Hemmert, M., Barczak., G., 2014. Trust Formation in University–Industry Collaborations in the U.S. Biotechnology Industry: IP Policies, Shared Governance, and Champions. *Journal of Production Innovation Management.* https://doi.org/10.1111/jpim.12242

Cervantes M., 2017. Higher Education Institutions in the Knowledge Triangle. *Foresight and STI Governance*, 11 (2), 27–42.

Compagnuccia, P., Spigarelli, F., 2020. The Third Mission of the university: A systematic literature review on potentials and constraints. *Technological Forecasting and Social Change*, 161, 1-30.

Contreras, J., & Rinehart, M., 2019. *Conflicts of Interest and Academic Research in Research* Handbook on Intellectual Property and Technology Transfer. Edward Elgar. Published, 01/2019.

de Vries, E.W., Dolfsma, W.A., van der Windt, H.J., Gerkema. M.P., 2019. Knowledge transfer in university–industry research partnerships: a review. *Journal of Technology Transfer,* 44, 1236–1255

Hamel, G., Doz, Y., & Prahalad, C., 1989. Collaborate with your competitors and win. *Harvard Business Review*, 67(1): 133-139.

Kogut, B., & Zander, U., 1992. Knowledge of the firm, combinative capabilities, and the replication of technology. *Organization Science*. 3 (3): 383-397.

Kopczynska, E., & Ferreira, J.J., 2017. How universities and industry can improve communication for open innovation? Paper presented at The ISPIM Innovation Summit – Building the Innovation Century, Melbourne, Australia on 10-13 December 2017.

Morris, B., & Hunt, R. (2007). Exploring the cultural differences of university-industry research collaborations and their management implications. In *Proceedings of the 8th International CINet Conference: Continuous innovation - opportunities and challenges : 7-11 September, 2007, Gothenburg, Sweden* (pp. 483-493). Continuation Innovation Network.

Patil, R.R., 2012. Academia-industry collaboration is not necessarily a conflict of interest in the context of public health education and research. *Journal of Education and General Studies*, 1 (2), 028-032

Resnik, D.B., & Shamoo, A.E., 2002. Conflict of Interest and the University, Accountability in Research. *Policies and Quality Assurance*, 9 (1), 45-64

Sonnenwald, D.H., 2007. Scientific Collaboration: A Synthesis of Challenges and Strategies. Annual Review of Information Science and Technology 41(1), 643-681.

Stokols, D., Harvey, R., Gress, J., Fuqua, J., & Phillips, K. (2005). Invivo studies of transdisciplinary scientific collaboration: Lessons learned and implications for active living research. *American Journal of Preventive Medicine*, 28, 202-213.

Villani, E., 2013. How external support may mitigate the barriers to university-industry collaboration. *Journal of Industrial and Business Economics*, 40 (4), 117-145

Walsh, J. P., & Maloney, N. G., 2002. *Computer network use, collaboration structures, and productivity.* In P. Hinds, & S. Kiesler (Eds.), Distributed Work (pp. 433-458). Cambridge, MA: MIT Press