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A Study about Project Management for Industry-University Cooperation Dilemma

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Abstract

As for strategic theory, industry-university cooperation is defined as an essential core functionality of industrial clusters. Industry-university cooperation has been recognized as an important strategy to make innovation happen in an industrial society today. Industry-university cooperation to organize a team that functions organizationally with a fixed-term at a university and the company, and can be defined as a project to address a purpose and values different from the past. Therefore, all those who have an interest in industry-university cooperation must be self-transforming. However, the need for self-transformation of individuals has not been strongly recognized up until now. In industry-university cooperation, conflicts of interest often exist. Therefore, those individuals interested in industry-university cooperation are faced with a dilemma. The purpose of this study is to reveal differences in values of the individuals in the company and that of the academic individual that produce such dilemmas. On top of that, the promotion of industry-university cooperation, project management methodologies on elimination of dilemmas arising from the difference in values are considered.

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1. Introduction

Porter¹ and Porter et al.² said that Japanese companies have been able to grow just by mimicking other companies through the penetration into the global market and the growth of their own domestic economy up until now. Today, however, economic growth has stopped and the Japanese companies have reached a new frontier of productivity. The performance of Japanese companies has become much worse. Japanese companies are committed only to mimicking, and therefore have no clear strategy to differentiate themselves based on innovation. According to Yoshikawa³, Japanese manufacturers, although technically being the best, their performance in the market is inferior. Because of this there is the dissemination of cheap products. This phenomenon is similar to the situation of the Galapagos Islands ecosystem that has its own existence without having contact with the outside world. He called it the "Galapagos Syndrome." In Japan, he said that mobile phones, electronic money, digital broadcasting, universities, young people, and Tokyo are in a "Galapagos phenomenon." Then According to the Oba & Fujikawa⁴, Japanese companies are considered to be in the "NIH syndrome." NIH means "Not Invented Here." The "NIH syndrome" refers to a tendency for the technicians not to use the in-house developed techniques. Even if royalties are paid, they can still sell their products if they can grab the market. In addition, if the production technology is better, products can be produced at lower cost than their competitors. However, it is said that Japanese companies will stick to their technology at high cost. In addition, Japanese companies that have fallen into "the trap of technology-oriented," which does not lead to profit even with developed technology. Technology development capabilities itself has become a weapon. Produce products with less technology is the aim. In a high-tech industry, recently it is said that at least 100 technologies or more maybe required developing a product. Therefore, a product does not complete using solely its own technology. For cross-licensing is required to finish the product, high-tech companies are no longer able to monopolize technology.

As a solution to the problem of Japanese companies with regard to these technological issues, activation of industry-university cooperation is desired. It is possible that individuals and the associated technology can be fluidized by linking business-to-business to open activation of industry-university cooperation. Thus, this can serve to form industrial clusters such as Silicon Valley in the U.S. that produce innovation.

According to a 2012 Report by the University Technology Transfer Council of Japan⁵, four Certified Technology Licensing Organization (TLO) cases were put into place in 1998. The TLO number was at its peak of 51 in 2008. That number turned shrank to into 42 in 2011. In Japan, the TLO number is in a downward trend because license agreements are not increasing. In the United States, the TLO number was 4 in 1979, but it increased to 187 in 2011. Then, the number of new licenses from the universities to companies was 1,229 in 1991, the number of new licenses increased to 5,362 in the United State in 2010. On the other hand, in Japan the number of new licenses from universities to companies was 1541 in 2011. The number of new licenses has not increased since 2005. In addition, ongoing license numbers of universities in the United States are greater than 39000. On the other hand, the continued license numbers of Japanese universities are 4509. The need for industry-university cooperation has been strongly recognized so far in Japan. Therefore, measures such as the establishment of TLO have been taken, but effective changes have not been made. The reason could be because it is considered that innovations in order to produce university-industry collaboration for changes in values of business people and academic are management techniques and because people are not able to respond to the change. For example, Okada⁶ has emphasized the need for establishing the mindset of for business person people as well as academics for university-industry cooperation.

Industry-university cooperation is a highly unique project in order to organize teams from different functional organizations, universities and industry, in fixed-term. Therefore, this paper is based on the hypothesis that there is a dilemma due to a conflict of interest when it comes to the change of industry-university cooperation for both the university and the companies. Then there is the awareness that they are unable to respond to the dilemma. Therefore, it is necessary to confirm that the dilemma exists. Transformation of values of organizations and individuals is necessary for industry-university cooperation, yet this has not been strongly recognized. The purpose of this study is to reveal differences in values of companies and academics that produce this dilemma. On top of that, the elimination of the management dilemmas that arises from the difference in values in order to promote promotion of industry-university cooperation. Managing the elimination of the dilemma arising from the difference of the values

is considered. A dilemma resolution method is proposed as an industry-university cooperation project management methodology.

2. Previous work

The importance of university-industry collaboration has been recognized in Japan because of successful industrious clusters in the United States. Porter⁷ mentions that the advantages and superiority of industrial clusters using the following three terms:

1. Improving the productivity of businesses and industries
2. Strengthening of innovation capacity
3. Creating new businesses

The competitive advantage by clusters depends largely on the free flow of information, the discovery of transaction and exchange that brings added value, planning coordination between organizations, willingness to cooperate, and strong motivation for improvement. Based on is that of these factors there is a sense of common interests, relationships, and networks. Accordingly, the description of the social structure of a cluster has an important meaning. In addition, among other factors, industry-university cooperation is one of the networks that is required. Sawai⁸ analyzed the differences between industry and academia from the institutional aspects. The system has a source purpose, an authority system for funds, and business potential related to confidentiality. The institutional aspects includes the intended purpose, an authority system, funding, and business potential related to confidentiality. Table 1 shows the analysis below.

Table 1. Differences between companies and universities in Japan Quoted from Sawai⁸.

	Company	University
Purpose	Pursuit of profit	Pursuit of knowledge
Authority system	Already established	Under maintenance
Funding	From the market (closed type)	Mainly taxes (open type)
Business potential	Direct	Indirect
Confidentiality	Rigid	Unclear

As for industry-university cooperation, universities, and companies had a need to work on research and development projects with different values in the past. Therefore, we consider that it was necessary to try and view this subject from both perspectives, the company and the university. We can see that there is a big difference in their motivation and values for, university-industry cooperation.

In PMBOK 5th edition⁹, stakeholder management has become a subject matter area. Therefore, “Initiating” and “planning”, “executing”, “monitoring and control” have been defined as each process group within other subject matter areas. The processes are “Identify Stakeholder”, “Plan Stakeholder Management”, “Manage Stakeholder Engagement” and “Control Stakeholder Engagement”. In the “Identify Stakeholder” process, persons who have influence on decision-making, the activity, and the outcome of the projects are identified as stakeholders. In addition, persons affected from the project are identified as stakeholders. Furthermore, interests, involvement, mutual dependency, and impact on the project success of the stakeholders are analyzed. They are recorded in the “stakeholder register”. In the “Plan Stakeholder Management”, the identified stakeholder’s ideas and expectations of the project are investigated. Measures of order to promote support of the stakeholders are considered. For example, those not happy with a project “hidden opponents” are encouraged to take a neutral position. People of neutrality for the project are asked to support. The stakeholders that already support the project are asked to further active involvement. In the “Plan Stakeholder Management”, the transition state of the stakeholder has been assumed: from “opposite” to “neutral” and from “neutral to “support”, while those transitions are promoted. Next, in the “Manage

Stakeholder Engagement", active involvement of the stakeholders for the project is created. In order to meet the stakeholders' needs and expectations, communications with stakeholders are taken throughout the project. Regarding working with stakeholders, the occurrence of problem is addressed. In addition, appropriate involvement in the project activities is promoted for stakeholders. This process is conducted according to the "stakeholder management plan" that was created when planning was done. However, stakeholders do not always act according to the intentions of the project manager. It is not easy to change the stakeholders from being strongly opposed to a project collaborator. The "Manage Stakeholder Engagement" process is considered to have priority to obtain proper involvement of the stakeholders. Therefore, efforts to proceed tenaciously certainly are required for the project manager. The project manager should achieve this during day-to-day operations. In the "Control Stakeholder Engagement" process, throughout the project, the degree of involvement of stakeholders is generally monitored. Additionally, strategies and plans to get the active involvement of stakeholders in the project should be adjusted. When a change in the feelings and behavior of stakeholders is confirmed, the strategy is changed accordingly. By controlling the degree of involvement, the negative impact of stakeholders is minimized and the positive impact of stakeholders is maximized. In previous studies, Stakeholder Management in a project management methodology system has been studied. On the other hand, since the mechanism of the project generates a "dilemma" for stakeholders, it is necessary to consider the measures to solve issues regarding the "dilemma".

3. Interview

In order to extract the differences in motivation and personal values between industry and academia, we interviewed three experts with experience in involving industry-university cooperation. They had experience working in both the private sector and the university sector. As for the method used for the interviews, a semi-structured interview techniques were utilized approach was used. The interviewer could follow an item, but was able to follow topical trajectories in the conversation that may stray from the item when it seems appropriate. This method was used because the intentions of the interviewer were not realized by the interviewee. Thus, it was said that arbitrariness would be eliminated. Items in the questions, they were comprised considering the following areas: Long-term-oriented, short-term-oriented, legal rights of acquisition, publication of research results, organizational, practical application, causality, cause-and-effect relationship, implementation, social responsibility, individual interests, motivation, and purpose. Questions referring to the items of Sawai⁸ were extracted by brainstorming and affinity projection.

A summary of the interviews are as follows.

<Short-term oriented or long-term-oriented>

University: They want to study topics of interest of their own based for a long-term plan.

Enterprises: In the short term, right now, they want to get the know-how and technology that can be commercialized.

<Research results or legal rights>

University: They would like to publish the research results in Journal for the Society faster than rivals. Known techniques cannot be patent. Therefore, it is impossible to announce the new technology in order to obtain a patent; they do not want to apply for a patent.

Enterprises: Keep trade secrets on technology and know-how hidden. Before publishing findings, they want to get legal rights such as intellectual properties.

<Application or organized>

University: They want to organize the basic theory in a comprehensive manner and establish a theme. In addition, there is a preference for the conventional wisdom by scholars that should be carried out systematically for leaning purposes.

Enterprises: They do not look for a systematic theory for the application from the ground up. Only applications that can be commercialized are required.

<Implementation or cause-and-effect relationship>

University: In order to qualify as academic research to elucidate the causal relationship and nature is required.

Enterprises: To be extreme, they do not have to know the nature and cause-and-effect relationship. They only want to market the product or service by the implementation of technology.

<Individual companies benefit or social responsibility>

University: From the values as a public institution, it is difficult for a university to give an exclusive license for technological know-how to an individual company. Additionally, if you donate a license for biotechnology and pharmaceutical field is donated, the ethical and humane social responsibility is also generated.

Enterprises: If they cannot exclusively use the know-how and technology individually, income of individual companies is reduced.

<Individual or organization>

University: They say that they cannot adapt to an organization just to make a profit, such as a company. They also say that the company will hold the university researchers in bondage with little effort. They want several researchers involved in projects and they prefer their academic contacts or links over efficiency.

Enterprises: By the research and development in an organized manner, they want to develop product technologies and know-how that can sell most efficiently.

<Motivation>

University: Motivation of researchers is internal incentives and self-realization.

Enterprises: They believe for all human beings, external incentives such as promotion or monetary reward will become the motivation.

<The purpose of industry-university cooperation>

University: Because they are asked for industry-university cooperation from the top-down, they want to make a track record of implementation. Therefore, this is the only reason for cooperation between the universities and industry. Additionally, industry-university cooperation is an alternative means of funding when public research funds are reduced.

Enterprises: industry-university cooperation is not the purpose. Acquisition of technology and know-how that leads to revenue is the purpose.

<Efforts attitude>

University: They believe that there is a need for industry-university cooperation, but they will not work on it more than necessary.

Enterprises: Because an academic person does not focus on the logic of the company, if it is possible to avoid, they do not want to work toward university-industry cooperation.

It is believed that dilemma exists in the industry-university cooperation, from considerations as described above. Further, Table 2, below summarizes the dilemmas.

Table 2. Conflicts of interest between companies and universities (Prepared by the author from interviews).

	Company	University
Intentionality	Short-term profit	Long-term research results
Intellectual property	Legal rights	Research Publication
Types of studies	The practical application by application	Organized from the foundation
Causality and practical	Practical use	Elucidation of cause-and-effect relationship
Responsibility	Individual profit responsibility	Social responsibility
Mind	Interests of the organization	Personal interests
Motivation	Promotion and remuneration	Self-realization
The purpose	Acquisition of technology / know-how	Industry-university cooperation itself
Attitude toward Effort	The minimum required	Avoid if possible

4. Consideration of project management methodology for industry-university cooperation dilemma resolved

In this chapter, management measures that could be adapted to the industry-university cooperation are considered as a tool for dilemma resolution.

The Avraham Y. Goldratt Institute¹⁰ proposed "Cloud" as a tool to solve the dilemma. He insisted on using the tool "Cloud" to find a common purpose. If you find a common purpose, you only need to solve problems to achieve the purpose. However, their focus was not on a method to consider the challenges to achieve a common purpose. Figure 1 below is an example of a "cloud". This tool would be a measure of the dilemma arising from the differences of industry-university cooperation purpose.

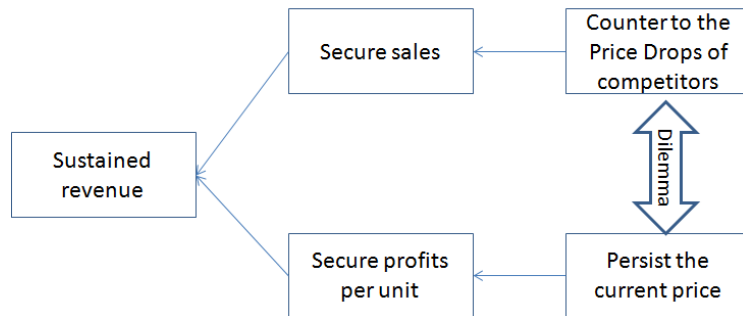


Fig. 1. Cloud Create based on Goldrat (2001)¹⁰ by author.

Research of Yamagishi¹¹ insisted on the following points through experiments. Strategic behavior (incentive negative) and Selective incentive (incentive positive) weaken "intrinsic motivation" for cooperation. Therefore, these incentives cannot eliminate the dilemma. These lead to vicious cycle of conducting non-cooperation. In other words, positive and negative incentives are not the way to produce practical countermeasures to eliminate the dilemma. However, the research did not focus on the proposed measures to resolve the dilemma. The purpose of this paper is to propose measures to resolve the dilemma mentioned previously. According to the Weman-Josefsson et al.¹², the e-health model project in Sweden based on the self-determination due to intrinsic motivation has improved the typical individual's of healthy life habits as a "social dilemma" problem. According to this model, superficial and commercial diet and beauty, energy enhancement, such as health advertising by economic interests, do not bring about actions to improve healthy lifestyles of individuals. Rather, they retract behavior improvement. Additionally, the presentation of information and the improvement effect for the life behavior habit control using the Web technology gives internal motivation as healthy life improvement in order to enrich life. Self-determination has had an effect on the improvement of life behavior for improved health lifestyle based on this concept. Internal motivation and self-determination is effective as resolution methods of dilemma. This theory might promote the factors that strengthen the industry-university cooperation motivation, and to remove the factors that weaken them.

As resolution of conflict of interest of functional organization in the demand forecast of supply chain, Mentzer & Moon¹³ described installation of a consensus building type organization as an effective method. A consensus building type organization is an organization where representatives of conflicting interests participate in a cross-organizational task force, in order to adjust the interests. When the TLO issue to this approach is adopted, not only the representatives of the University take part, but also it is necessary that representatives of the industrial side participate.

In addition, there is a change agent role to measure the spread of innovation and to eliminate the dilemma of change. The Change Agent is a concept that was developed in the field of applied behavioral science and applied sociology in the United States. Lippitt & Westley¹⁴ considered Change Agents as consultants, scientists and professionals with the technical knowledge that are involved in the process of

change. On the other hand, Rogers¹⁵ showed the role of Change Agents on the agricultural context that focused on 69 villages in Brazil, 71 in Nigeria, and 108 in India. He also discovered that Change Agents that have higher expertise can become foreigners to the people, and they do not function as a Change Agent. This suggests the need to place a person having the role of a change agent to deal with the dilemma of industry-university cooperation in the TLO.

Stanford University provided the license of electronic sound source patent to Yamaha, Inc., a manufacturer of musical instruments in Japan. Yamaha, Inc. has created a new product with such as a sound source of on mobile phones and a synthesizer based with on this patent. At Stanford University, Nils Reimers has been called the "father of technology transfer" in during the 1960s. According to Takahashi & Nakano¹⁶, Reimers adjusted both the industry and academia, not by law or engineering, but with a marketing idea. This suggests that the capability of a change agent should be trained with a marketing mind.

Based on the above previous research, project management of dilemma resolution of industry-university cooperation projects are proposed hypothetically. Methodology is described in terms of theory, tools, organization, and human resources. It is shown in Table 3 below.

Table 3. Dilemma resolved methodology of industry-university cooperation projects.

Points	Methodology	Overview
Theory	Internal motivation and self-determination	Self or internal motivation and Sense of purpose that was decided on their own
Tool	Structural strategies and psychological strategies	Incentives dilemma solution is given.
	Cloud	Tool to find a common purpose
	Website of information for behavioral change	Web sites that provides information to promote internal motivation and self-determination
Organization	Task Force type consensus organization	Organization responsible for forming a mutual understanding and agreement
Talent	Change Agent of marketing ideas	Change Agent for achieving the elimination of the dilemma of stakeholders

The contents of the above Table 3 have been shown in Chapter 3 of the interview subjects. They said that there was an effect by implementing a hypothetical methodology. Therefore, in the future, it is necessary to verify the effects of this hypothesis.

5. Conclusion

It has been confirmed that a dilemma has occurred due to a conflict of interest between universities and companies in industry-university cooperation projects. In the promotion of industry-university cooperation projects, the transformation of the university attitude has been focused on so far. However, the dilemma of conflict of interest between the academic endeavors and production is an issue of promotion has had very little study. In addition, the following are management measures that may be effective in the resolution of the dilemma of industry-university cooperation projects.

- Common goal for academic and production is to be sought.
- External incentives are given to the enterprise; internal incentives are given to academic side.
- Change Agents can understand both the academic and the industry are need training.
- A general hands-on approach from individuals who also have expert knowledge on how to operate a TLO.
- Both university and industry, with an open mind without barriers.
- TLO to develop a marketing capacity.
- Established a personal and industry-university cooperation organization within the enterprise, in order to work with the university TLO.

In addition, future work on this study will be as follows:

- The researchers "intrinsic motivation" is weakened by the purpose of profit when it comes to industry-university cooperation?
- Specify the optimal incentives of industry-university cooperation.
- Verification of the effectiveness of management measures.
- Systematization of the management methodology of industry-university cooperation projects

The following approaches are what we should take for the future research of the above:

- Statistical analysis by questionnaire in order to identify the factors that weaken the factors that strengthen both the industry-university cooperation motivation.
- Case studies of optimal incentives of industry-university cooperation are executed.
- By applying management measures to a university-industry cooperation project, action research is executed.
- In the project process, dealing with industry-university cooperation dilemma is standardized.

In addition, in this study we showed the dilemmas of following industry-university cooperation. Those are Long-term-oriented, short-term-oriented, legal rights acquisition, publication of research results, organizational, practical application, causality, cause-and-effect relationship, implementation, social responsibility, individual interests, motivation, and purpose. These were considered to be dealing with the dilemma of purpose and motivation. Future of research issues should consider other dilemmas. Finally, in order to promote industry-university cooperation, it is necessary to design system incentives. Therefore, based on the principal-agency theory, we can take into consideration incentives. Both the industry side and the university side are the agents, and are also the principals. Therefore, by taking actions giving priority to interests of the agent themselves, both industries and universities cause the agency to lag. Both suitable incentives for each respective type of academia collaboration should be considered.

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