

PRIMARY COOPERATION METHODS IN RESEARCH - DEVELOPMENT - TECHNOLOGY TRANSFER BETWEEN HIGHER EDUCATION INSTITUTION AND ENTERPRISE IN VIETNAM

MA. Nguyen Thi Sam

samnguyen241129@ftu.edu.vn

Faculty of Business Administration, Foreign Trade University, Hanoi, Vietnam

Abstract

In recent years, Vietnam university education has experienced significant developments in scale and diversity of major and mode of study. There is a swift from elite to mass education which is more practical in the training system. Since university autonomy has become popular, many big universities are currently striving to respond to industrial situations through modules connecting universities with industry, business and service sectors. In the context of cooperative research between universities and enterprises, researching results might be more committed with specific requirements and development of the enterprises. On the one hand, enterprises would bridge the gap by sending signals of market demands as well as industries to institutions. On the other hand, they pose quests for innovation and research and training updates. As a result, it is true that the study of cooperation methods in research – development – technology transfer between higher education institutions and enterprises in international integration has practical meanings in the current situation.

Key words: *cooperation methods, higher education institutions, enterprises*

1. Introduction

The cooperation in research – development – technology transfer between higher education institutions and enterprises plays an important role in knowledge-based societies and economies. The collaboration happens to partly support the institution upgrading training quality and job opportunity for students. Besides, it comes the chance for the enterprises to change technology as well as access to modern equipment and updated manufacturing production. Moreover, there are several indirect achievements: knowledge-based economy development support, new established enterprise assistance, small and medium enterprises assistance, economic growth and job opportunities.

The cooperation between institutions and enterprises in research, development and industry transfer boils down to “knowledge trading” between universities and manufacturing business for mutual benefits. Those tradings are able to go direct or indirect, individual or common. In terms of the shared values, cooperation stimulates the interaction between lectures, students in universities and experts in enterprises. It also commercializes research

results, builds training programs, organizes lifelong learning and supports startup effort and organizational management.

Due to the specialization of majors, each institution has their own advantages - disadvantages and capacity to divide into occupational groups. In general, cooperation methods in research – development – technology transfer between higher education institutions and enterprises includes: Cooperation in research and development; Commercialization results of research and development; Transferring students; Transferring scholars & experts; Building and implementing training programs; Promoting lifelong learning; Inspiring startup spirit and supporting startup activities; Joining the university administration. The detailed analysis on each group is mentioned as below.

1.1. Definition: Cooperation between education institutions and enterprise

In many countries, universities - business collaboration and several cooperation methods are studied thoroughly. It is considered trading between universities and manufacturers which is toward the shared values. On the one hand, working with enterprises brings along the university financial support for schools while enterprises benefit in achieving and remaining competitive advantages in an active economy currently. On the other hand, the cooperation might boost economic growth and answer the labor market's requirements (Carayon, 2003; Gibb & Hannon, 2006).

The cooperation between higher education institutions and enterprises boiled down to the engagement of scholars as well as officers in universities, State offices and departments with local units which were involved. It pointed out the attention on works, policies as well as actual results of methods on paper and reality (Dan, 2013).

Therefore, the relationship and cooperation are defined direct or indirect, individual or public methods of cooperating between universities and enterprises with a target on shared values: Cooperation in research and development; Commercialization results of research and development; Transferring students; Transferring scholars & experts; Building and implementing training programs; Promoting lifelong learning; Inspiring startup spirit and supporting startup activities; Joining the university administration. The detailed analysis on each group is mentioned as below.

1.2. Definition - Cooperation between higher education institutions and enterprises in research - development - technology transfer

The relationship works as an effective method which enhances training quality, research and technology transfer. It has a good impact on training activities, research, university improvement and usage of human resources in both universities and enterprises.

Cooperation between higher education institutions and enterprises in research - development - technology transfer stimulates engagement of lecturers, students and experts

working in enterprises. In addition, it encourages commercialization results of research and development; Transferring students; Transferring scholars & experts; Building and implementing training programs; Promoting lifelong learning; Inspiring startup spirit and supporting startup activities; Joining the university administration.

Therefore, cooperation in research, development and technology transfer in the cooperation between higher education institutions and enterprises are all forms of direct or indirect interactions, having an individual or organizational characteristics, between institutions and enterprises, and about research, development and technology transfer between the parties in order to support each other for the benefit of both sides.

1.3. Cooperation methods in research, development and technology transfer between higher education institutions and enterprises

There are a lot of authors who suggested different ways to classify cooperation methods. Santoro (2000) classified cooperation between universities and enterprises into 4 types: research support, technology transfer, knowledge transfer, and research cooperation. Davey, Muros, and Meerman (2011) gave a more detailed way to divide cooperation methods. This is the result of a study on university-enterprise cooperation in Europe in 2010 – 2011, as follows:

- Cooperation in research and development.
- Transferring scholars & experts.
- Transferring students.
- Commercialization of results of research and development.
- Building and implementing training programs.
- Promoting lifelong learning.
- Inspiring startup spirit and supporting startup activities.
- Joining the university administration.

Thus, there are a variety of studies on cooperation in research, development, technology transfer between higher education institutions and enterprises. University-enterprise cooperation is expressed in many methods and levels. The low and common levels are: Receiving students for internships, field trips, financial support and facilities support for teaching and learning. The higher levels are: Expert exchange and knowledge and technology sharing; investment in research and implementing for joint ownership and technology transfer; joint investment in business development in order to commercialize scientific research results and provide products and services to the society.

2. Method

Our research team approached the study of popular cooperation methods in research – development – technology transfer between higher education institutions and enterprises in Vietnam in dialectical methods and positivism and comparison. Using a dialectical method, our

team studied the roles and connections of parties who joined in promoting the collaboration between higher education institutions and enterprises. In detail, we inspected theoretical basics and reality of the cooperation then identified specific methods of cooperation. By positivist and comparison methodology, we conducted surveys, researched and compared advantages and disadvantages of specific forms, thereby evaluated effects and finalized solution systems and recommendations towards cooperative forms in research – development – technology transfer between higher education institutions and enterprises in Vietnam.

Primary data is collected by depth interviews with higher education institution experts and professors, enterprise managers, Agency for Enterprise Support – Ministry of Planning and Investment, Agency for Enterprise Cooperation, and so on.

Our research team plans to interview 05 higher education institutions and 05 enterprises and authority in charge departments joining in the cooperation of institutions and enterprises ecosystem in each group.

3. Results

3.1. Advantages and disadvantages of cooperation methods in research – development – technology transfer between higher education institutions and enterprises in Vietnam

Relationship and cooperation methods in research – development – technology transfer between higher education institutions and enterprises in Vietnam conveys vital meanings. This is the force for training institutions in particular and knowledge-based economy in general in the Fourth Industrial Revolution. The success of the relationship is to improve training quality and work with enterprises to transfer technology, knowledge to the manufacturing area. Moreover, the relationship is considered trading between universities and manufacturers towards shared values. To improve the cooperation and explore its values stands a chance to help not only universities figure out financial issues but also enterprise to achieve and keep competitive advantage in the current active market. In addition, it contributes to economic growth and responses to job requirements in Vietnam.

As mentioned above, there are several methods between institutions and enterprises. Considering the result level that limitation and level of the cooperation might be easy to evaluate and analyze. At this level, there are eight cooperation methods and their advantage - disadvantages are shown in Table. 1.

Table 1. Advantages and Disadvantages of Cooperation methods

No.	Cooperation methods	Advantage	Disadvantages
1	Cooperation in research and development	<ul style="list-style-type: none"> - Implement easily, have potentials - Take advantage of human resource in both; - Have beneficial effects on training, research and manufacture. 	<ul style="list-style-type: none"> - Need groups of professional and enthusiastic scientists and experts.
2	Commercialization results of research and development	<ul style="list-style-type: none"> - Improve research and transfer technology; - Provide training institutions with financial support. 	<ul style="list-style-type: none"> - Require products to response to standards of enterprise; - Require price and quality competitive highly.
3	Transferring students	<ul style="list-style-type: none"> - Provide students with practical knowledge; - Provide students with the opportunity to find ideas and innovation to upgrade manufacturing activities. 	<ul style="list-style-type: none"> - Fail to gain high productivity because students lack experience and depend on training courses and associate programs of enterprise.
4	Transferring scholars & experts	<ul style="list-style-type: none"> - Provide scholars and experts with opportunity to update knowledge; - Help enterprises upgrade latest technology, help institutions get updated manufacturing reality to edit practical training programs. 	<ul style="list-style-type: none"> - Remain a likelihood to discontinue teaching, researching and managing processes of both.
5	Building and implementing training programs	<ul style="list-style-type: none"> - Design training program based on reality; - Diver the training program and motivate the engagement of learners. 	<ul style="list-style-type: none"> - Require time for result verification of edited programs; - Require lecturers to update new information.
6	Promoting lifelong learning	<ul style="list-style-type: none"> - Provide enterprises with learning spirit; - Enhance manufacturing productivity and enterprise management. 	<ul style="list-style-type: none"> - Require learners to manage time to avoid impacts on manufacture.
7	Inspiring startup spirit and supporting startup activities	<ul style="list-style-type: none"> - Improve startup spirit among students; - Motivate sponsorship (if successful) 	<ul style="list-style-type: none"> - Require stable social capital from enterprises and sponsors.
8	Joining the university administration	<ul style="list-style-type: none"> - Make all information about training and economy transparent; - Access modern and positive management methods; - Construct and complete development strategies of training institutions. 	<ul style="list-style-type: none"> - Pose difficulties for manager staffs (principal, chairman) of training institutions; - Remain unclear in the policy framework that makes enterprise unwilling to associate.

Source: Survey data collected by authors

It is clear that the factors leading to the cooperation must be learned to build up action strategies which fits the context to improve the cooperation in research – development – technology transfer between higher education institutions and enterprises. However, the biggest matter that the majority of school and institution administrators find is the insufficient consideration of financial shortage whereas taking bureaucracy for granted. The scholars in universities might assume that the State is supposed to provide financial resources toward developing between institutions and enterprises. They considered it the burden lies on relationships with the State in spite of the fact that they likely come over with a strong motivation and proper awareness on benefits in some cases.

3.2. Impact of cooperation methods in research – development – technology transfer between higher education institutions and enterprises in Vietnam

Institution and enterprise cooperation is no longer a new terminology over the world. It plays an important role in ensuring and upgrading training quality for students that are new resources for enterprises. Building and implementing cooperation between institutions and enterprises in terms of human resource is considered an urgent call as well as an compulsory task to which the universities and enterprises chairman boards pay attention. However, according to the International Labor Organization, there are under 20% of employees receiving professional training which has failed to respond to the market requirement in Vietnam. Many enterprises are in need of high-qualified workers while the number of graduates is insufficient. There appears a challenge with both institutions and enterprises. One of the human market issues is supply - demand disequilibrium. Given a worker is more qualified, he finds it more challenging finding a job.

Table. 2 illustrates survey results on cooperation methods in some universities and institutions in Vietnam on some research majors including Economics, Business and Management Field; Medical Field and Healthcare; Engineering and IT Field; Manufacturing and Processing Field; Agriculture, Forestry and Fisheries Field.

Table 2. Cooperation methods of some higher education institutions in Vietnam

Average number of cooperations Cooperation methods	Economics, Business and Management Field	Medical Field and Healthcare	Engineering and IT Field	Manufacturing and Processing Field	Agriculture, Forestry and Fisheries Field	Average of all fields
Cooperation in research and development	4.6	27.2	11.2	12.6	14.2	13.96
Transferring scholars & experts	16.4	25.8	21.2	14.0	11.6	17.8

Transferring students	25.2	28.4	21.0	11.0	14.8	20.08
Commercialization of results of research and development	2.4	23.0	7.4	6.6	12.2	10.32
Building and implementing training programs	6.0	8.0	4.8	5.4	4.8	5.8
Promoting lifelong learning	3.2	3.6	3.2	2.6	1.8	2.88
Inspiring startup spirit and supporting startup activities	3.6	2.2	3.8	2.2	2.6	2.12
Joining the university administration	0.6	1.0	1.0	1.0	1.0	0.92

Source: Survey data collected by authors

As analyzed in Table 2, we can see that there are various cooperation methods between education institutions and enterprises, however, the impact of cooperation methods on each field are different. From the survey data, it is shown that in this sector, Transferring students method (Average no. 20.08) and Transferring scholars & experts method (Average no. 17.8) accounts for the majority compared to other methods. It indicates that education institutions always value highly-educated scholars and experts, and practical knowledge gained from manufacturing and business companies, as well as always put students at the center and find solutions to improve the training quality.

Application of other cooperation methods are still quite limited, for example, Commercialization results of research and development (Average no. 10.32) are mainly used in the group of universities in Medical Field and Healthcare. Application of methods such as Building and implementing training programs (Average no.5.8), Promoting lifelong learning (Average no. 2.88), Inspiring startup spirit and supporting startup activities (Average no. 2.12), and Joining the university administration (Average no. 0.92) are also limited. The reason is that there still exist many difficulties and obstacles hindering cooperations between higher education institutions and enterprises. It can be seen that, thanks to cooperation with enterprises, universities have opportunities to reform their organizational and management structures towards efficiency; to adjust, update training programs and training and research methods to make it more suitable with actual needs of enterprises and recruiters.

In a real situation, students always want to study at universities having close

relationships with enterprises so that they can increase their chance to get hired after graduation. Universities with enterprise-oriented mechanisms and organization also have better opportunities to update advanced training methods.

However, being able to find an enterprise that cooperates closely with the institution and provides them support is a huge challenge that meets many limitations. Many enterprises still hesitate to accept students as interns with a fear that it may affect business activities. The short internship period also prevent enterprises from thoroughly guiding students. Therefore, it is necessary to have a deeper understanding of the connection between education institutions and enterprises, which will help discover difficulties and obstacles in the cooperation between education institutions and enterprises, thereby two sides can propose suitable solutions in order to strengthen the cooperation. Cooperation between education institutions and enterprises brings not only advantages for students at the present, but also benefits in the long run.

4. Discussion and Conclusion

According to the above analysis, here are some specific solutions to promote the relationship between education institutions and enterprises in cooperating in training, research, development and technology transfer.

4.1. Solution to promote cooperation in research

Education institutions as well as enterprises need to set up a department specialized in connection and cooperation. There are two forms of cooperation strategies: (1) Signing cooperation agreements on training and technology transfer, and (2) Becoming a shareholder of enterprises (in the inform of individual institutions or university groups with the same training fields). Through these cooperation methods, education institutions can get a closer look at enterprises in order to understand their requirements for high-quality employees, for technology transfer, etc. This is also a good chance for universities to expand their brand image, and to enhance their abilities and financial investment efficiency under the situation of "institutions going financial indepent". The cooperation helps enterprises to have direct contact with a lot of students, to be able to monitor and evaluate their working style as well as their knowledge and ability in the most accurate way. Therefore, enterprises will know how to recruit, to select suitable employees and to expand their brand image. In addition, the cooperation with education institutions also helps enterprises to access the most recent, most up-to-date research results which can be applied in their manufacturing and business activities.

4.2. Solution to promote commercializing results of research

Commercialization represents "financial assessment of institutional intellectual property". It depends on how intellectual property is commercialized, therefore, to promote

commercialization, the following basic solutions need to be implemented:

- Joint research: Bringing research into practice through cooperation means bi- or multilateral cooperation, in which each partner brings a deposit (research potential, capital, feasibility of investment, connecting with practice, etc.). It usually focuses on larger and more difficult projects, and often involves basic research.

- Order-based field research: Research is performed under a contract, in which the sponsor (enterprise) defines the research task (or result) that a scientific research institution (university) would implement. This leads to the creation of an intellectual property, which will be implemented by the sponsor and the law depending on the form of the signed contract.

- Intellectual property (IP) rights transfer (or sell): When the owner of IP rights (especially industrial rights) wants to avoid the risk of obsolescence in the IP (because the further use will be inefficient and unprofitable), the best strategy is to transfer ownership of IP.

- Licensing: If the IP rights holder is unable to bring the IP object to market on his own or to ensure commercial success to the required extent, a good strategy is to license. The rights holder licenses other parties to use the IP based on mutually agreed terms.

- Establishment of subsidiaries: This form of technology transfer is chosen for the independent use and development of IP belonging to academic or research institutions and for the creation of a product or service that is usable on the market. Activities of a spin-off enterprise often involve the author(s) of the IP. IP is provided to the spin-off enterprise through rights transfer or licensing agreements. Organizations can also purchase shares in a subsidiary.

4.3. Solution to promote students' ability to transfer

During the training process, enterprises support facilities for students to visit and do their internship: The internship process helps students to apply the knowledge and skills learned at institutions and to integrate well with future working environment. Therefore, enterprises can connect with education institutions to receive students as interns and create opportunities for them to get the best internship environment.

Enterprises cooperate with education institutions on training students during their time in institutions. For the training process, enterprises can coordinate with the institution in order to discuss with students contents and topics related to manufacturing and business activities, and to share practical experiences, practical problem solving, soft skills training, etc.

Having a strategy of "nourishing", "nurturing" talents at universities by granting scholarships, investing in facilities, technology, finance, recruiting before and after graduation; Ordering training facilities to solve the necessary problems that enterprises are occurring and are going to occur...

4.4. Solution to promote lecturers' activeness and transfer

During the time working at universities, in addition to the main tasks, lecturers are also required to carry out the actual research of enterprises to apply in lessons at their university. The purpose of this task is to encourage students to have a realistic mind, as well as to inspire lectures to do practical research, so that they can come up with ideas and practical research topics.

Institutions and enterprises need to have detailed mechanisms and policies when using a team of scientists and managers to teach necessary contents in the training program as well as to participate in seminars and talks about technology transfer.

4.5. Solution to promote cooperation in building and implementing training programs

Institutions need to update training programs and methods frequently based on enterprises' needs. They also need to do frequent discussion, and to find enterprises' needs for employees in order to build learning outcome standards for the training process.

Enterprises need to actively “dig deeper” into the institution system (including leadership apparatus, curriculum, content, teaching methods, thesis defense, graduation thesis, etc.) in order to offer suggestions and adjustment of the training program, so that it can “match” the needs of enterprises and society. The policy of bringing entrepreneurs into the university council has recently been seen as a step forward in the strategy of socializing education as well as training to meet social needs. This is also an opportunity for enterprises to expand their brand image...

4.6. Solution to promote lifelong learning

To achieve this goal, it is necessary to have solutions coordinated between education institutions and enterprises, specifically as follows:

During the training process, institutions need to guide their lecturers and their scientists (especially young scientists) to spend time learning and doing research practically at enterprises, in order to approach and perceive knowledge which is updated by enterprises and transferred from foreign countries to apply in manufacturing.

Education and research institutions also need to coordinate in designing and implementing training programs that are sustainable and inclusive in order to solve pressing problems of different fields, on the basis of predictable solutions to narrow the gap and incompatibilities among academic and professional standards.

4.7. Solution to promote cooperation in university administration

The institution governance mechanism needs to be built and continuously improved to match the training needs and the development of society.

The administration of training and research facilities will also be performed by one leader (such as Rector, President of the School Council, etc.). The leader must have qualities like: strategic mind; ability to assign tasks; good employee control, etc.

In order for a training and research institution to have sustainable development, it is necessary to have a number of solutions to promote cooperation between training, research, development, and technology transfer institutions with enterprises, as follows:

- Inviting experts in the field of business management to participate in the institution council to join hands in building a high-quality, practical and transparent training institution.

- Coordinating in building and sharing experience in using employee management and evaluating software to adjust its usage to the characteristics of training institutions.

4.8. Conclusion

In the current situation, cooperation between universities and enterprises is an inevitable trend in the socio-economic development of all countries. The width and depth of this relationship depends much on the orientation of the authorities, the choice of methods as well as the compromise of both sides. The effectiveness of the connection is always to raise the “position”, to strengthen the trust as well as to increase the level of positive influence on the social life of the associated parties.

Shortening the distance from the lecture hall to business practice is an urgent requirement for higher education institutions and the enterprise community. The Communist Party of Vietnam and the Government always encourage, while the society is urgently demanding, "barriers" are only within the scope of subjective factors of the associated parties.

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