

# The Integrated Tripod Missions of Academic Researcher towards University Technology Transfer: A Case Study of Srinakharinwirot University, Thailand

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**Abstract**—The main purpose of this study is to explore the relationship between integration tripod mission of academic researcher in the university and the achievement of the University's technology transferred to private sector. Semi-structured and in-depth interviews were conducted for this study. The result of this study reveals that academic researcher who do three missions, as research, teaching, and community service with integrated method, are achievement of technology transfer to private sector significantly. This study contributes to understanding the methodology for researcher to do their missions and increase the rate of transferring technology to outside the university.

**Index Terms**—Technology transfer, university research, transfer mechanism, academic researcher.

## I. INTRODUCTION

In the modern era of globalization characterized by stiff international competition, many countries are focusing on research to develop science and technology. This includes intensively transferring the research agenda at universities or public laboratories to serve industry to spur innovation. Exporting technology from universities to industry will drive the growth of the national economy [1]. Research commercialization from universities creates opportunities to support economic and social growth [2].

Universities with a large number of researchers, scholars, and scientists have an essential role to push and encourage new knowledge in terms of research and technology as well as basic research, including applied research to outside. From the past study, the technology from universities to the private sector is a mechanism for economic and industrial country growth [3]. As well as another studied noted that to transfer research from universities into the commercial market helps economic and social growth.

In Thailand, one of the main policies of the government is focused on science, technology and Innovation. The policy framework is to support research and development in the university or public research institute, link between private sectors and researchers for emerging transferring research and technology process towards the economic and social development.

Regarding to the government's policy, all of the universities in Thailand have to push effort to conduct their research and contribute to private sector. After all, academic

researchers are not only do research only, but also have a major responsibility for teaching, and community service. Therefore, the university policy's maker encourages the academic researchers to achieve all of their missions.

The Integrated Tripod Mission, including teaching, community service, and researching, is a crucial mechanism for driving technology transfer to the outside. The output or knowledge from research and teaching linkage should be carried to solve any problem in the community with a maximized benefit to the economic development of the country's regions.

As the changed academic researcher's mission engagements, I was interested in studying the relationship of implementation an integrated tripod mission and the successful transferring technology outside from universities. However, many professors in the university argued that to hold all missions in the same time is barriers to meet private sectors.

The benefit of this study will provide guidance to policy makers to encourage and support the academic researchers in the university do all mission concurrent with awareness the importance of technology transfer.

The main purpose of this study is to explore the relationship between integration tripod mission of academic researcher in the university and the achievement of the University's technology transferred to private sector. It focuses mainly on factors in the Thai context. In-depth interviews were used to collect the data. The target samples were selected from professors in universities who were successful in transferring technology. This study contributes to deeper understanding of the problems encountered with doing their mission and finding the ways to overcome barriers and increase the rate of transferring technology to outside the university.

### Research Questions

- 1) How does the integration tripod mission of academic researchers in the university associated with the achievement of technology transfer to private sector?
- 2) What factors are support academic researchers to link between their integrated tripod missions leading to transfer technology?

## II. LITERATURE REVIEWS

### A. Process of Technology Transfer from University

Among with the organizations involved in doing research including universities, government laboratories, private laboratories or private organizations, the university is the

most important of transferring research to outside organizations since it is the center of human resources, idea resources, advisers and specialists [4]-[6]. The most popular types of research transfer to outside university are IP Licensing and Spin – off [7]. Some papers include contract research. Technology Transfer Process from universities can be divided into two stages; discovery and exploitation [10]. The discovery stage is when a scientist has a novel new idea or knowledge. The exploitation stage is when scientists take advantage of those ideas for practical benefit. At this stage, few research are delivered to outside. There are still created in terms of both basic and applied research. Reference [8] named this "Ivory Tower" research. This depends on the characteristics of the researchers in terms of entrepreneurship. Intellectual property (IP) can be evaluated as successful measurement. Potential commercial based research such as high value commercial research can be measured from IP or application-orientation [9]-[12].

There are 9 methods of transferring technology from the university to outside. 1) Collegial interchange, conference, publication 2) Consultancy and technical services provision 3) Exchange Program 4) Joint venture of R&D 5) Cooperative R&D agreement 6) Licensing 7) Contract research 8) Science Park, research park, technology park or incubators and 9) Training.

Universities should modify tasks and procedures for the effective transfer of technology to developing the country's economy [13]. In addition, policy maker should find the appropriate strategy to help professor in the university to transfer their research. The process of technology transfer at the University has of three types; 1) Resource Consolidation or sharing resources 2) Local Seed Scattering infrastructure to support researchers in technology transfer and 3) Use of a Dynamic Knowledge Internet Portal Internet technology to move knowledge from the university. To reduce the limitations of the interaction between researchers and the public sector, "Knowledge Management System" is a powerful tool in bringing expert knowledge for development by the link between technology owner and expert searchers.

Reference [14] A model of technology transfer are different forms; 1) The Information Dissemination Model 2) The Licensing Model 3) The Venture Capital Model 4) The Large Company - Joint Venture Model 5) The Incubator-Science Park Model that used for most laboratories.

There are four possible ways to initiate a university–industry relationship [15] 1) firms may look for the research centers who might resolve whatever problem they have. 2) They may directly receive collaboration proposal from suppliers of technology, the research institutes 3) firms may also ask for assistance through a third party, which will then look for the best university research center available. And 4) they may also receive proposals from liaison third party to initiate collaboration with the local R&D institutes.

### *B. University Technology Transfer Office*

Reference [16] The previous study found that the efficiency of technology transfer agency have to three factors; 1) Researchers accept and believe in agency task 2) Management of such agency focus on running the business which he should be based on the experts in industry and

business. And 3) the research is more quality. If research and academic quality. So, the agency's efficiency and effectiveness of technology transfer to help researcher meet achievement.

Government Technology Transfer should have an effective process for the selection of potential research [19]. The study how to evaluate the program and perceived success or failure project of Technology Transfer at the university in Israel, find that the conditions for the selection of research using the same criteria as Venture Capitalists. There are six factors for measurement the potential research for transferring, market demand or need, market size, existence of Patent, success changes for R & D stage, level of innovativeness, and degree of maturity of the idea.

The University Technology Transfer Office (UTTO) is a center between researcher and private sector. Not only researcher will contact the UTTO to convey research outside, but private sector will also try to contact the UTTO in well-known university for finding the technology too. Therefore the efficiency and effectiveness of UTTO management will help emerging academia and industry collaboration. "Without inventors, it is might not have the technology. But if there are no experts in technology transfer, it may cause restrictions on the transferring technology". The relationship between the inventor and expert in technology transfer is essential to bringing research to market successful.

UTTO's motivation is to safeguard the university's intellectual property, while at the same time market that intellectual property to firms, including securing additional research funding for the university via royalties and licensing fees, sponsored research agreements, and an intrinsic desire to promote technological diffusion. UTTO managers or university administrators work within the bureaucratic framework of the university.

### *C. Key Stakeholders in the Transfer of Technology from Srinakharinwirot University to the Private Sector*

There are three key stakeholders in the Srinakharinwirot University for transferring technology to the private sector.

- 1) Strategic Wisdom and Research Institute of Srinakharinwirot University (SWURI) has a responsibility to gather all research in the university, linkage and co-ordinate between academic researcher and private sector, manage IP licensing, and consult as an incubator for researcher in order to start-up business. Technology transfer from SWURI are almost IP licensing.
- 2) Center of Academic Service has a center of the university to service private sector such as training, consultancy and technical services provision, joint venture of R&D, or contract research. CAS will deduct service fee from total project cost.
- 3) Sometimes academic researcher deal with private sector directly or under faculty.

### *D. The Integrated Tripod Missions of Academic Researcher*

Regarding to Office of the Higher Education Commission (OHEC) of Thailand, three missions of academia in the university are set to be a framework and appraisal criteria; teaching, researching, and community service. Each evaluation year, all academia must complete all missions.

There are some arguments “Nowadays, academia have task excessively. Moreover, it is obstacle for them to do something should do,” Nevertheless, there are some successful academic researchers who achieved all missions and transfer brought out their knowledge to industry sector.

### III. METHODOLOGY

The objective of exploratory research is to clear and reliable research questions for further empirical research [17]. It should be conducted to analyze both primary and secondary data. Qualitative research was used to provide the conceptual framework in the literature review and designed semi-structured interviews.

This study emphasized academic researchers from Srinakharinwirot university with a vary majors. 10 academic researchers who have been successful in transferring technology from their research during 2013 – 2014, undertaken by Strategic Wisdom and Research Institute of Srinakharinwirot University were selected. Five researchers accepted the in-depth interviews. Purposive or judgment sampling technique is appropriate when working with small sample size. Two researchers came from the faculty of Science, two from Social Science, and another one from faculty of Engineering. Although some researchers were in the same university, they were interested in different areas and culture context of research. Therefore, the diversity of their successful was raised to discuss the relationship between type of research and successful transferring technology exploitation.

### IV. RESULTS AND DISCUSSIONS

Our interviews revealed that the integration tripod mission of academic researchers in the university associated with the achievement of technology transfer to private sector significantly. Although some researchers in the previous study said that it is impossible to do all tasks because of *Time*. This is the main obstacle factor for academic researcher. But the result of interview found that well organized tasks and time management are the crucial factors to lead researcher success. All tasks can do in the concurrent time. All academic researchers specified problem research from doing community service. The results of their research not only used for teaching in class, but also ready to use for transferring technology to outside.

A general model of the Integrated Tripod Missions towards Technology Transfer from University is shown in Fig. 1.

To integrate tripod missions at the individual level, academic researchers generally started doing research. At the same time, the outputs of these research will be improved in learning and teaching in class. Researchers gather more problems or questions from the students, their knowledge and experiences were developed a research framework for the next time. It is a model of Research Based Instruction. Outcomes from integrated research and teaching will be reported or shared to community outside in various forms, traning, teaching, or consulting. Sometimes, researcher will give back the problems from community recurrently.

From the interviews with SWURI’s staff, research outputs from above steps have more quality and potential to transfer to market. In addition, there is efficiency method to increase sustainable university network. UTTO collaborate with industry to make full use of the transferred technology from the adoption stage to the commercialization stage easily. The university (or academic researcher) gave back the industry’s knowledge of the market to come up with more and more new, applicable and successful technology development. The result is consistent with, the industry, realizing the mention abilities of the university and the urgent needs to keep up with the global competitive market where the latest technology is essential, turns to the universities that are considered to be responsible for the basic research and technology development. They are the developers, organizing knowledge and identifying the needs of the ultimate users or adopters.

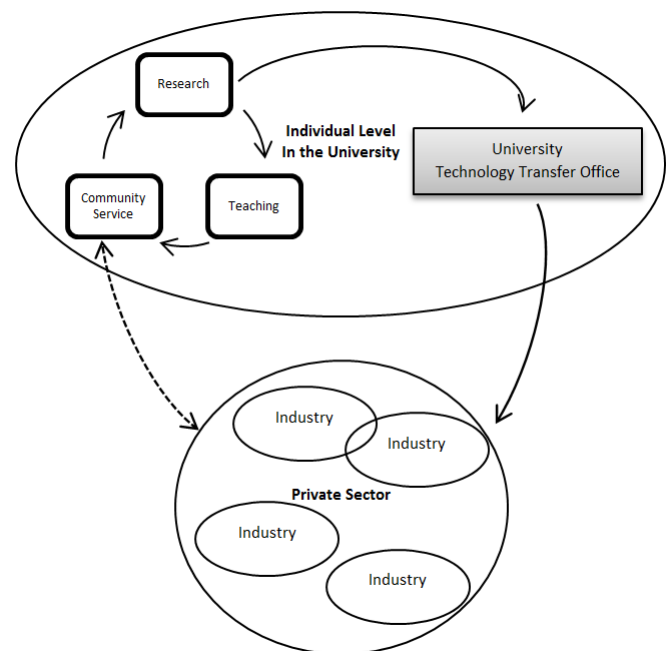


Fig. 1. The integrated tripod missions towards technology transfer.

As the result, it is concluded that the integration tripod mission of academic researchers in the university is associated with the achievement of technology transfer to private sector significantly.

Additionally, it is found that strong network between UTTO and private sector, management policy concerning with rewards or incentive for researcher, are the essential factors that supporting academic researchers to link between their integrated tripod missions leading to transfer technology stimulate researcher willing to do all missions simultaneously.

### V. CONCLUSIONS

In this paper, the main purpose of this study is to explore the relationship between integration tripod mission of academic researcher in the university and the achievement of the University's technology transferred to private sector. In-depth interviews were used with academic researcher in the university in Thailand context. The result of this study

reveals that academic researcher who do three missions, as research, teaching, and community service with integrated method, are achievement of technology transfer to private sector significantly. This study contributes to deeper understanding of the problems encountered with doing their mission and finding the ways to overcome barriers and increase the rate of transferring technology to outside the university.

## VI. LIMITATION AND FURTHER RESEARCH

This study only discussed with the researcher in one university and focused on university in Thailand regulation and context. Further research should be studied in others areas of research and other universities characteristics in order to compare factors or barriers that would yield different results. In addition, it should be studied the academic researchers who have failed or cannot transfer technology to outside, the obstruction of this mission.

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