

The Role of Successful Technology Transfer (Commercialization) to Improve the Technology of Applied Science University

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Abstract: According to an article of Hsu et al the relation between the variables in general and analytical model of research. Four variables of human, financial, commercial, cultural, or institutional resources have been studied. The study used a descriptive method of mathematical modeling and in terms of purpose it is applied. At first, studying the records of the plan and then working on the main theme of the thesis are considered. The results showed that in human resource part, sub-factors of the college quality; in financial resources, the sub-factor of industry; in Commercialization, the sub-factor of patent portfolios; and in cultural resources, the sub-factor of incentive policies were the top priorities.

Keywords: human resource, mathematical modeling, Commercialization.

INTRODUCTION

In recent years, motivation of various universities for development has turned from focus on sheer research and development to the development of Applied Sciences and entrance to business world. Many of big universities have attempted to develop technology transfer resulting in the development of technology incubators and close relation with technology parks. Development of such programs has created a closer relation between universities and various industries, so that universities can play a more active role in the economy of country. Development of new applied science, training skilled manpower in the form of academics consultants, reduction of the cost of research due to faster achieving of large and small companies to laboratories and libraries of universities, integrated social networking of academics that understand the relationship between universities and research centers and industry ,the possibility of easier justifying of domestic and foreign investors and improving the status of universities and students in the community can be mentioned as some of the results of connection between universities and industry [1]. Although all the benefits as the results of connection of universities with industry are not unexpected, the mechanism of development of relations in different countries is very different and requires detailed plans.

Universities are one of several institutions that in addition to institutions and enterprises as well as research institutes have attempted to develop knowledge and modern technologies for economic agencies. In addition to development of knowledge and

modern technology, universities are capable of practice and commercialization of new knowledge [2]. Commercialization of research results is one of the important steps toward innovation system guaranteeing stability and continuity of research. In addition to providing significant economic value for enterprises, it facilitates knowledge-based economic growth of society. Commercialization is converting the new findings and research ideas into products and services and technologies available on the market; in the other word, commercialization of research set is attempts made to sell research works aiming to gain profit and further association of education and research with economic and social goals. According to the above definitions, commercialization can be seen as delivering an idea or innovation to market [3].

The task of the universities in the field of science is research conduction and making it practical and their task is not only to create new knowledge. In fact, developing links with industry through research and partnerships at various institutions such as technology incubators and technology parks can be considered as some activities having a major role in making new knowledge practical. In addition, it forms one of the main missions of universities in the field of current complex business [4]. The most important factor of commercialization of university research is partnerships between academia and industry as well as the establishment of small companies affiliated to the university [6]. Many studies have shown that application of knowledge in many areas requires the

creation of a coherent network between universities and industrial and government organizations [5].

In recent years, by following policies and programs of scientific development, we have witnessed a considerable growth in scientific products in the country, but what can tie the growth to stable development of the country, and create dynamism and effectiveness of academic institutions is applying and commercializing scientific achievements to improve social welfare. Analyzing the challenges of commercialization of research and technology achievements show that the main problems in this area are mainly due to lack of proper definition of research projects aimed at commercializing and tailored to the specific needs of industry and society, orientation of existing projects to meet the needs inherent in the national or international market, the lack of need of the product and service to innovation, lack of experience and expertise required for commercialization of achievements, unclear role of researchers in the commercialization process and their lack of motivation for active participation in the commercialization.

In order to set up technology, different issues such as collaborative research, contract research, consulting, technology licensing, high training, advanced training for staff, research staff exchanges and other formal forms or formal information transfer must be considered that are placed in four areas: human resources, cultural and institutional resources, financing and business resources [6].

In successful commercialization of technologies in universities, it appears that four main criteria of cultural / institutional resources, human resources, commercialization resources and financial resources are involved. However, what needs to be studied is the effect and the interplay between these

factors together and determination of the relative importance (weight) of each of these criteria.

To determine the association between measures, Delphi method and technique of interpretational structuring (ISM) and analytic network process will be used that in this study, we are seeking to examine the relationship between these criteria, so that by calculating the weight of a subset of these factors, important factors affecting the performance of technology transfer at the Universities can be identified. In this regard, the Delphi method, technique of interpretational structuring and analytic network process will be used.

Interpretational structuring technique is applied for structuring elements (indicators) effective in solving a problem (improving a system). Interpretational structuring technique leads to creation of a "diagraphs" of the complex relationships between the elements in a system and facilitates its study [7]. In the first step, the elements or indicators from a system should be listed and then the relationships between elements must be determined using a Yes and No questionnaire. Then the group decision making for consensus on the relationship between each pair of A, B elements is identified, and ideas of experts participating in the survey for paired comparisons of influencing parameters (e.g. A, B) will be asked. Afterwards, consensus of the possible relationship for a couple of criteria will be identified. Then, we determine the relation between the components and then by forming adjacent matrix and access matrix, we do software categorization from access matrix, so leveling is performed.

Conceptual Model of Research

According to an article of Hsu *et al.*, [6], the relation between the variables in general and analytical model of research can be considered as the chart 1-1.

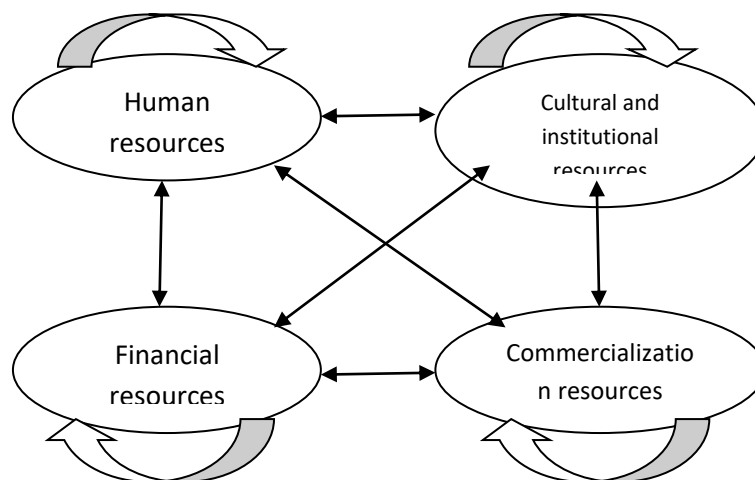


Fig-1: Conceptual Model of Research

As shown in Figure 1-1. Different variables relationship affects the commercialization of the technology. Four variables of human, financial, commercial, cultural, or institutional resources have been studied.

RESEARCH METHOD

The study used a descriptive method of mathematical modeling and in terms of purpose, it is applied. At first, studying the records of the plan and then working on the main theme of the thesis are considered.

Group of Experts

Group of Experts of the present study is managers of Applied Science University of Markazi province. Information on them is given in Table 1-3 and as multi-criteria decision-making methods are used, a large number of managers cannot be taken into account. For this purpose, 20 senior managers were selected for review and analysis of factors effective in Performance technology transfer at the University.

To review research questions in the first round by the Delphi method and open and rating questionnaire, factors affecting the technology transfer in the organization were determined. Then, using interpretational structuring technique (ISM), the relationship between factors was specified. Using network analysis process (ANP) weight of factors and their prioritization will be determined, which are as the following based on the order of research questions:

1. What are the factors affecting the performance of technology transfer at the University?

To determine the influencing factors, the Delphi method as well as open and rating questionnaire has been used.

2. How is the conceptual model for the relationship between the factors affecting the performance of successful technology transfer at the University?

To determine the association between factors affecting technology transfer function, interpretational structuring technique has been used.

3. Among the factors affecting the performance of technology transfer which one is more important?

To determine the importance of the factors affecting the performance of the technology transfer, process network analysis has been used.

DISCUSSION AND CONCLUSION

What are the factors affecting the performance of technology transfer at the University?

Factors affecting performance of technology transfer at University include four sources that Hsu *et al*

[6] used in his research. To check the compatibility of these resources at the University, the Delphi method was used, and according to the results of obtained scores that were higher than average, it was shown that these resources can be examined as factors affecting the performance of technology transfer at the University

How is the conceptual model for the relationship between the factors affecting the performance of successful technology transfer at the University?

To determine the conceptual model and the relationship between factors, interpretational structuring technique has been applied. According to the two-option Yes and No questionnaire, adjacent matrix was formed, then, according to the access matrix, ranking was done. The results showed that the financial resources were in the first level and human, cultural and commercialization resources were at the second level.

Among the factors affecting the performance of technology transfer which one is more important?

To determine the importance of the factors, process of network analysis was used. In the beginning, according to the network structure that was obtained in the previous step, before super matrix was formed. In addition, to determine the weights of criteria and putting it in super matrix, pairwise comparison questionnaire was used. Thus using MATLAB software, super matrix was stabilized in cube and weights of factors were extracted. The results showed that the development of entrepreneurship, entrepreneurial experience, experience of technology transfer offices and number of staff with high-ranked qualifications are at the first ranks, and quality and size of the faculty, the university location and patent portfolios come last.

In research conducted by Hsu *et al* [6] considered 22 sub-factors for the four main factors. In the initial phase, six sub-factors of college size, technical sections size, number of staffs conducting full-time researches, the University location, development of entrepreneurship Programs and entrepreneurial experience were deleted and their research was conducted according to 16 sub-factors. The results showed that in human resource part, sub-factors of the college quality; in financial resources, the sub-factor of industry; in Commercialization, the sub-factor of patent portfolios; and in cultural resources, the sub-factor of incentive policies were the top priorities.

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