



# Relationship Between Ability Improvement of the “Xuehui” and Project Supported by the Science & Technology Association — Analysis of W City in China

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**Abstract:** As a grass-roots organization of the Science & Technology Association, “Xuehui” do a lot of effective work in promoting the prosperity and development of science and technology, and promoting the popularization and improvement of science and technology. In order to promote the further development of the “Xuehui”, W city supported the “Xuehui” by choosing the best choices since 2012. In recent years, the society has developed rapidly, but whether and to what extent does this development be driven by project funding? Based on questionnaires and interviews, the data of 27 projects funded “Xuehui” and 36 “Xuehui” which were not funded by Science & Technology Association of W city were collected. Then, the impact of project funding on the development of “Xuehui” ability was discussed through comparative method and analytic hierarchy process. Finally, this paper points out that the government and the Science & Technology Association should strengthen the support of the policy and fund of the society, and promote the construction of the information and work platform of the society, the “Xuehui” itself should improve the organization, actively transform the scientific and technological achievements, and improve the service of the members.

**Keywords:** Science & Technology Association, Project Financing, Xuehui Ability, Development

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## 1. Introduction

The concept of “Xuehui” was first proposed by Liang Qichao, and he believed that “We need a wide range of talents to promote China, we need the development of “Xuehui” to have a wide range of talents”. In 1895, Sun Zhongshan promoted the establishment of agricultural society. Subsequently, a group of Modern Natural Science Societies, represented by the drug “Xuehui”, began to emerge and continue to grow. After the founding of new China, the government attached great importance to the development of the Science & Technology Association, and repositioned it from the aspects of administrative attribution, organizational nature and tasks. And made it cleared that the Science & Technology Association is a mass organization of science and technology workers, and a link between the party and the scientific and technological workers. “Xuehui” is the grass-roots organization of the Science & Technology

Association. In practice, “Xuehui” do a lot of effective work in promoting the prosperity and development of science and technology, and promoting the popularization and improvement of science and technology. At present, the “Xuehui” has become an important part of the national innovation system, and it is also an important force to promote the development of science and technology and drive the development of innovation. In 2011, comrade Xi Jinping put forward the four directions of the Science & Technology Association: serving the economic and social development, improving the scientific quality of the whole people, serving the scientific and technological workers and self building [1].

In order to promote the development of the ability of the “Xuehui”, the W city Science & Technology Association has funded the “Xuehui” through the project form. In the past 5 years, 27 “Xuehui” have been funded 51 times. However, does the Science & Technology Association project support the development of the ability of the “Xuehui”? To what extent

does it promote the development of the ability of the “Xuehui”? In order to solve this problem, this paper collected data on the ability development of 27 funded societies and data on the ability development of 36 unfunded societies through questionnaire survey and field interview. Then, in order to provide countermeasures and suggestions for the further development of the “Xuehui”, this paper analyzed the improvement of ability by the project funding “Xuehui”.

## 2. Literature Review

The scholars have studied the significance, the evaluation method and the content of the scientific and technological projects, and put forward a more systematic view. In terms of evaluation significance, Zhang Liping and Chen Hui (2005) think that scientific and technological project evaluation is an important part of science and technology management system [2]. It plays an important role in strengthening the management of science and technology projects, improving the efficiency of technological resources allocation and investment efficiency. In terms of evaluation methods, Lin Jianheng (2004) applies AHP to the evaluation process of scientific research projects in Universities in China, and overall evaluation of science and technology projects from the aspects of economic efficiency, academic level, personnel training and social benefits [3]. Li Ru, Zhang Lifang, Zhu Chengyuan (2006) proposed a combination weighting fuzzy comprehensive evaluation method, and applied to information management and evaluation system of national science and technology 863 experimental projects [4]; Wu Xianhua and Ma Tinghuai (2006) introduced the evaluation method of science and technology project based on rough set theory, establish the evaluation index system [5]; Zhang Junguo, Ren Hao and Xie Fuquan (2007) used fuzzy mathematics to calculate the input output ratio of Shanghai's financial science and technology projects, and evaluate their performance [6]. Liang Jiye, Zhu Chengyuan, Hu Jianlong (2008) point out that the expected goals and data of the contract task book and the actual situation and actual data after the completion of the project should be compared and analyzed in order to judge the achievement of the actual target of the scientific and technological project [7].

Ma Lina and Li Jianhua (2008) aim at the problem of inaccurate and incomplete information in project evaluation, use hierarchical grey method to set up a scientific and technological project evaluation model, and analyze the reasons for the low efficiency of input and output of scientific and technological projects, and point out the direction and extent of the next adjustment [8]. Some other scholars use other qualitative or quantitative methods. The qualitative methods include Delphy's method and peer review method. Quantitative methods include AHP, multiple attribute decision making and fuzzy comprehensive evaluation [9]. In the evaluation content, Shen Chang'e, Ceng Shaowu (2009) believes that the evaluation of the project includes three parts: basic research, project management and project performance, they also divided the project performance evaluation index

into three categories: scientific and technological achievements, economic benefits and social benefits [10]; Zhang Jingna (2015) established three index system for performance evaluation of science and technology projects include business indicators and financial indicators [11].

The purpose of scientific and technological project evaluation is to optimize the allocation of scientific and technological resources, improve the efficiency of technology resources, and promote the output of science and technology. However, the existing research is less concerned with the evaluation of the Science & Technology Association. Therefore, according to the nature and tasks of the Science & Technology Association, this paper constructed the index system of project implementation, project schedule, budget, initial ability, improve intent, project implementation effectiveness and project sustainable development ability seven aspects, from the investigation of the service innovation ability of the “Xuehui”, the service society and government ability, the ability to serve science and technology workers, and self development ability, not only consider the results, but also concerned about the process; in the aspect of index selection, both subjective and objective indicators is concerned; in the evaluation method, the qualitative and quantitative analytic hierarchy process (AHP) is adopted to evaluate systematically.

## 3. An Analysis of the Improvement of the Ability of the “Xuehui” That Funded by the Science & Technology Association

### 3.1. Summary of the Basic Situation of the Society

There are 99 societies in the W city, including 11 science, 23 engineering, 6 Agricultural Sciences, 24 medical, 21 comprehensive science classes, 5 entrusted management and 9 colleges and universities. These “Xuehui” are different in the history of development and in the field in which they belong. But it has the following four common features: the number and scale of the “Xuehui” have been continuously improved; the registered capital is generally low and the source subjects are similar; the independent office space has low occupation rate and few full-time staff; the way of learning service is influenced by the operation capital.

### 3.2. Descriptive Analysis of the Improvement of the Ability of the “Xuehui” That Funded by the Science & Technology Association

The research of this article is carried out under the support of the W city Science & Technology Association. In order to increase the validity of research, this paper not only collected data from 27 funded “Xuehui” in recent five years, but also collected data from 36 unfunded “Xuehui” in recent five years, and totally recovered 315 questionnaires, excluding 28 incomplete questionnaires, and got 287 valid questionnaires. This paper measures the service innovation ability of the “Xuehui” based on the 12 dimensions of academic activities,

promotion of scientific and technological achievements and so on. It turns out that in the past 4 years, the service innovation ability of the subsidized “Xuehui” was 1.12 higher than that of the unsubsidized “Xuehui” 0.94.

In terms of serving the society and the government, this paper measured the 5 dimensions of government work, policy recommendations and so on, and found that in the past 4 years, the average ability of service society and government of the subsidized society was 0.37 higher than that of the unsubsidized society 0.25. In terms of service science and technology workers, this paper surveys the 9 dimensions of talent recognition, international exchange recommendation and so on, and finds that the average ability of service technology workers of subsidized “Xuehui” is significantly higher than that of the non-subsidized in the past 4 years. In terms of self development, this paper is based on the 6 dimensions of team building, system construction and so on. It is found that the self-development ability of the subsidized “Xuehui” is higher than that of the non-subsidized “Xuehui” in the past 4 years. Finally, by comparing the single project grants “Xuehui” and the continuous project funded “Xuehui”, this paper finds that the latter has more significant development. This suggests that project funding has a positive effect on “Xuehui” in the 4 capabilities improvement.

**3.3. Analysis of the Contribution Rate of the Science & Technology Association Project Funding to the Improvement of the Ability of the “Xuehui”**

This paper adopt the analytic hierarchy process method to discusses the contribution rate of the Science& Technology Association project support to the improvement of the ability of the “Xuehui”.

**3.3.1. Determination of Contribution Degree and Contribution Weight**

First, the classification and score of the 4 abilities are determined by the head of the “Xuehui” in person to ensure the reliability and validity of the results. Contribution grade division and score are as follows: contribution is small (1-2 points), contribution is general (3-5), contribution is greater (6-8) and contribution is great (9-10 points). Then, according to the scores of the various abilities of each “Xuehui”, the contribution of the ability to the overall capacity improvement is calculated. The calculation method is as follows:

$$X_{ij} = (n_1 x_{ij} + n_2 x_{ij} + \dots n_{10} x_{ij}) / N$$

$$N = \sum_{i=1}^{10} n_i$$

In which  $n_i$  represents the number of i scores for the item, N represents the total number of the “Xuehui”, and the integer is taken after calculation of  $X_{ij}$ . According to the survey data, we have calculated the contribution of each ability to the total ability: the service innovation ability is 9, the service society and the government ability is 8, the service science and technology worker ability is 7, and the service self development ability is 8.

Then, according to the contribution of each ability to the overall capacity, the weights of the contributions to the total capacity are calculated. The calculation method is as follows:

$w_j = X_j / \sum_{i=1}^4 X_i$ . After the actual data is substituted into the formula, the weights of each ability are respectively: the service innovation ability is 0.281, the service society and the government ability is 0.248, the service science and technology worker ability is 0.219, and the service self-development ability is 0.246.

**3.3.2. The Degree of the Impact of the Science & Technology Association Project Funding on the Ability Improvement the of the Society**

First of all, in order to ensure the reliability and validity of the results, the degree and score of the factors that affect the ability improvement of the “Xuehui” are determined and evaluated by the leaders of the various “Xuehui”. The classification and value of the influence degree are as follows: The influence is small (1-2 points), the influence is general (3-5 points), the influence is greater (6-8) and the influence is great (9-10 points).

Then, the leaders of the “Xuehui” score the following 9 dimensions: project implementation effect, project progress control, expenditure rationality, full-time staff ratio, capital adequacy, initial ability, operation standard, social relations of leaders, attention to the work, special funds support. Then, according to the following formula to calculate the ultimate value of the factors to improve the capacity.

$$Y_{ij} = (n_1 y_{iju} + n_2 y_{iju} + \dots n_{10} y_{iju}) / N$$

$$N = \sum_{i=1}^{10} n_i$$

In which  $n_i$  represents the number of i scores for the item, N represents the total number of the “Xuehui”, and the integer is taken after calculation of  $Y_{ij}$ .

*Table 1. The impact factor score of “Xuehui” ability’s improvement.*

	Serve innovation ability	Serve society and government ability	serve science and technology workers ability	Self-development ability
project implementation effect	6	6	7	8
project progress control	5	7	6	6
expenditure rationality	4	5	6	7
full-time staff ratio	8	7	5	7
capital adequacy	7	6	5	7
initial learning ability	7	6	5	7

	Serve innovation ability	Serve society and government ability	serve science and technology workers ability	Self-development ability
operation standard	8	5	6	7
social relations of leaders	7	8	5	6
attention to the work	7	7	6	8
special funds support	8	7	7	8

Then, we calculate the extent to which the influence factors play a role in the improvement of capacity. The calculation method is as follows:

$$g_j = Y_j / \sum_{i=1}^4 Y_i$$

The results showed that the impact of special fund support on the improvement of service innovation ability is 0.119, and the extent of the promotion to the service society and government capacity, the service technology worker ability and the self-development ability is 0.109, 0.117, 0.114 respectively.

### 3.3.3. The Contribution Rate of Special Fund Support to the Improvement of the Ability of the "Xuehui"

According to the impact of special funds on the promotion of four capabilities, the contribution rate of special funds to the improvement of "Xuehui" ability is calculated. The calculation formula is as follows:

$$\lambda = \sum_{i=1}^4 g_i w_i$$

According to the evaluation of various factors on the degree of the ability to improve, the weight of the ability to the overall ability, we have calculated by the calculation:

$$\lambda = 0.119 * 0.281 + 0.109 * 0.25 + 0.117 * 0.219 + 0.114 * 0.25 = 0.115$$

That is to say, 11.5% of the ability improvement of project funded "Xuehui" is driven by the science and Technology Association's special funds.

## 4. Countermeasures and Suggestions to Improve the Ability of the Society

Through the survey of the "Xuehui" of W city, it is found that the "Xuehui" has a steady development trend on the whole. However, through comparative analysis, it is found that the ability improvement of the "Xuehui" with project support is more obvious, and the contribution rate of the Science & Technology Association project support for to the development of "Xuehui" ability is 11.5%. Because for the "Xuehui" which is generally lack of operation capital, with the support of science and technology project funds, it can employ full-time personnel to carry out the work of the "Xuehui" and improve the standard of operation of the "Xuehui", which is very helpful for improving the professionalism and efficiency of the "Xuehui".

As a superior organization, the Science & Technology

Association should strengthen the policy support to the "Xuehui"; give economic support for societies with great potential for development and poor profitability; coordinate relationship between the tax administration department and "Xuehui" to help the "Xuehui" obtain tax reduction or tax exemption qualifications; promote the construction of the working platform, promote the association and communication between "Xuehui" and society; promote "Xuehui" participate in government policy consultation, serve innovation and entrepreneurship and the international exchange and cooperation of the members; promote the information construction of the society, expand the social influence of the "Xuehui" by giving full play to the demonstration and leading role of the star class "Xuehui". Secondly, the attention of the leadership should paid to the work of the "Xuehui" and the reasonable payment of funds also have some influence on the development of the "Xuehui". Therefore, "Xuehui" should improve organizational structure, employ full-time staff, constantly improve member services, improve academic communication level, and steadily promote informatization construction. In addition, the government should attach importance to the development of the "Xuehui", give support and guarantee in the policies, resources, project funds and talents aspects actively. Meanwhile, the government should give full play to the role of the bridge, accelerate the marketization of the "Xuehui" research achievements, promote the connection between the scientific and technological workers and enterprises, and improve the ability and enthusiasm of scientific and technological personnel to serve the society.

## Fund Project

- (1) Fund Project of Hubei province' Department of Humanities and Social Sciences, Fund item number: 16Y191;
- (2) Education Department of Hubei province' Scientific research project, Fund item number: B2016213;
- (3) Fund Project of Huanggang Normal University, Fund item number: 2015002403;
- (4) Fund Project of Huanggang Normal University, Fund item number: 201708303;

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