

SPECIFIC PARTICULARITIES OF SCIENCE AND TECHNOLOGY RESEARCH LABOR

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Abstract:

S&T research labor is a specific field of labor. The study of specific particularities of this field falls within the scope of social studies. S&T research labor is an effective tool that is capable of creating strong driving forces if a healthy environment for social development is harvested. If the innovative environment is hindered, the S&T features have no room to develop to their full potential. Instead, they would become decorative objects or even tools for profit seeking individuals.

The objective of this paper is to identify social aspects and specific particularities of S&T research labor. Then some conclusions will be made on the ways where S&T policies for sustainable development in Vietnam can enhance the endogenous potential of S&T workers.

1. Introduction

Significant S&T achievements have deep impacts on the socio-economic development of nations all over the world. It can be said that all nations recognize the important position of S&T in their economic development strategies. The more developed the nation, the clearer the recognition of this important role. Even developing nations that recognize the role of S&T can utilize the benefits from S&T activities without significant investment in developing strategies and smart set-up management mechanisms. Some countries in the Asian region such as Japan, South Korea, Singapore and Taiwan, for example, have chosen human resource based development strategies. In fact, human resources are the most precious values of a nation. Among these human factors, most attention is focused on the management labor and S&T research labor as a platform to the human resource development strategies.

In order to have a smart set-up development strategy it is necessary to know how to orient impacts from S&T factors. This requires the adequate assessment of values and specific particularities of S&T research labor. The main focus of this paper is to identify and analyze the particularities of S&T research labor.

2. Basic notions

Before considering the particularities of S&T research labor we need to define some basic notions of S&T research labor and activities.

2.1. Notion of labor

According to *Petit Larousse Illustré*, 2001, (p. 1028 [1]), labor is “the human activity applied for production and creation or maintenance works” (translated French).

From a philosophical point of view, labor is “the human activity oriented to change the nature and connect humans and this activity generates the values” (translated French) [1] (p. 1028).

From the above definitions, it can be inferred that labor is the human activity targeted and oriented to generate either material or mental social values.

In some way labor can be divided into three types: physical labor, artistic labor and mental labor, described as follows:

- Physical labor is the type of labor which generates values mainly by physical skills, tools and equipment. In this type of labor there are both simple and complex groups of skills. Laborers in this type include workers, farmers and various services which require mainly manual force;
- Artistic labor is the type of labor which generates products mainly to meet demands of aesthetic and mental values. Products of this type of labor are generated mainly from creative works and talents which are developed through learning, training and perfecting activities;
- Mental labor is the type of labor which generates products mainly based on knowledge and intellectual activities, which are predominantly acquired through learning and training processes.

2.2. S&T research labor

S&T research labor is a type of systematized human activity oriented to generate, refine and apply science-technology products.

Some interpretations of the above notion are as follows:

- a. Human activities get systematized and only human labor is made in a systematic manner. This system is based on production, diffusion and application of S&T products.
- b. S&T products can include:
 - Discoveries;

- Scientific papers and proofs of new findings, laws, theorems or existing knowledge's raised up to higher level;
 - Papers to summaries, provide or synthesize scientific forecasts, action strategies, scientific counter arguments and analysis, etc.; and
 - Solutions, procedures, technical know-how attached with or without tools to turn resource potentials into products [10].
- c. Because of the nature of S&T research labor the S&T products do not always emerge as goods [2, 3]. Basically S&T products must include two main elements:
- They must be novel and created by scientific methods; and
 - They must be useful for social activities.

3. Specific particularities of s&t research labor

3.1. Mental labor

Capacity for mental labor cannot be attained by everyone. It is also not the type of labor which can be mobilized at any time for the same intensity and for a consistent quality of product. The efficiency of mental labor is dependent on the capacities of the brain, training process, psychological state, satisfaction and even the motivation of laborers themselves.

It is possible to consider the aspects of mental labor in the three ways outlined below.

3.1.1. S&T labor: This type of capacity for mental labor depends largely on genetic structure and inherited aptitudes. These capacities, however, are established and shaped after training and working stages.

3.1.2. Artistic labor (e.g. artists, music composers, movies stars, etc.): While aptitude for these types of capacities of mental labor must be developed through training and practicing, the most important parts are genetically inherited.

3.1.3. Management labor: These types of capacities for mental labor require thorough training processes for management and business skills as well as genetically inherited talents. Management labor is both science and art, therefore integrating two elements: formation and talent for management labor where the communication skill is a kind of artistic labor.

The specific characteristics of mental labor are as follows:

- Capacities for mental labor are not available to every one. They do not appear at any time;

- Without being used over time, capacity for mental labor will reduce, or even disappear;
- Necessary conditions for effective mental labor include gifted aptitudes, creative and hard working spirits, full and integrated formation, spiritual comfort and creative thinking freedom;
- Globally, the efficiency of mental labor depends on the health of the mental and physical state of mental laborers.

3.2. Creativity of labor

S&T research labor is creative work. The creativity is the state of human labor oriented to generate new products accepted by the society. Necessary characteristics of S&T labor are outlined below.

3.2.1. Novelty: Novelty is the crucial element required for a creative product. To be called a creative or S&T product it must be novel. It may be a new product, method, paper, idea, theorem, model, solution, use mode, application, etc. Novelty means absence of existing previously or if others did exist previously, being in an unequally sophisticated state.

3.2.2. Usefulness: Usefulness is practical acceptance. Practicality is here interpreted in a broad sense, where it could have relevance to the market, society, teaching programs, and editorial boards of journals, associations or even a group of scientists.

3.2.3. Scientific method of research: Generally the two aforementioned features of novelty and usefulness are sufficient to qualify work as creative. In addition, however, S&T labor requires the application of one or more scientific methods of research to get a new S&T product.

In fact, creativity in artistic labor can result from improvisation, inspiration or feeling. Creativity in production labor can result from extensive experiences. Creativity in S&T labor however, cannot generate products without applying scientific methods of research. Scientific methods of research combine scientific knowledge, research experiences and technical measures for the collection and assessment of scientific information and data in order to identify and prove the objective accuracy of research subjects. It is this last element which provides the clear distinction of S&T labor from other types of creative labors.

3.3. High risks of S&T labor

Risks are common features of human activities when the chances for success are uncertain. The higher the level of uncertainty, the higher the level of risk

is. The level of risk increases when the chances for success remain uncertain and the investment volumes for capital and time are large.

This explains the fact that in their investment efforts for S&T potential development, many countries spend huge expenditure but are not certain they will gain fruitful outcomes in all the fields and projects that they target. It is certain, however, that the global benefits that S&T activities bring to the national economy always exceed the investment volume made for S&T potential development.

The risks in this field also suggest that S&T research activities usually have inherent difficulties and unpredictable outcomes. The risks in the field of technology research are particularly high because this type of research is related to market fluctuation, knowledge and management skills of researchers.

3.4. High level of individual independence

The independence of individual researchers is perceived as a decisive role for success. Generally in creative labor, the most creative individual researchers would hold the dominating role. In contrast, for simple manual works of channel digging for example, it is impossible to say whose individual work is importantly deciding (of course, the management work is important but it is not a simple labor). The teaching activity is more complicated and this labor requires the individual role and the teaching method. Then there is no way to make equal the works of all teachers and it requires a higher level of individual independence.

Creativity in artistic, management and S&T labor requires a higher level of individuality, almost having a dominating role. Despite recent statistics showing an increasing number of co-authored S&T research studies, even more than the number of studies completed by single authors, it is clear the contribution of all co-authors (in this context we don't consider many cases of so-called "inserted" co-authors against which the authentic authors are very clearly identified).

The role of team work, however, is not to be ignored in research activities. Team work makes sense when there is a share of crucial parts in the implementation of applied research programs and when they are well targeted and based on identifiable products. In addition, the role of research teams is known as guaranteed counter-arguments of creative works. Even in this optics the individual independence plays its deciding role.

3.5. The contribution of S&T labor to the development of human society

S&T labor has significant impacts to the development of human society, which are generally delayed but very evident. It is easy to recognize these impacts that have resulted from science-technical revolutions, where S&T labor has played a critical role.

The arguments and the theories on the role of S&T labor are studied by many authors [5-7]. In the history of development across many nations, even during poor periods, wise leaders have always supported and recognized the role of S&T labor by implementing policies that are consistent with institutional and financial actions. One of the globally agreed conclusions is that S&T development is the most efficient means of investment.

In light of this, the question remains as to why half-way investment for S&T development is so prevalent leading to the so-called “brain drain”. The direct and subjective reasons would suggest it is because of limited budgets, inefficient assessment mechanisms, or even because of the level of influence and qualification of authorities. One of the objective reasons would suggest that it is related to the delayed effects of S&T labors. Typically there will be delays which may extend to very long timeframes, however tendencies suggest these delays are shortened and get very short in developed countries [7].

4. Important conclusions

4.1. Particular resources

The S&T labor is the mental labor of S&T researchers. This type of labor is a particular resource that is valuable to every nation. Because of its unique characteristics, it should be mobilized wisely to enable significant impacts for development. If it is not mobilized wisely, its potential remains untapped and can disappear altogether. Once S&T potential is lost, extensive time and efforts are required for its recovery.

4.2. Suitable environment required for creativity

The ideal environment for all types of creativity is:

- The freedom in reasoning and presenting scientific concepts;
- The right to retain the findings and inventions; and
- The right to access free international communication and information sources in S&T fields.

An environment where creativity can flourish is beneficial to the whole society. When such an environment is created, it means that creativity is not

owned by or assigned to any one person. As result, the creative labor is the labor of people with knowledge and full citizen status. It is important that the people clearly understand how their society treats and respects creative labor. In the creative labor encouraging environment the resultant efficiency from this labor is significant. If this environment is not established, people are likely to refuse to conduct creative labor and will undertake their works in other types of labor. If this becomes the general trend, it will be at a great loss to the society.

4.3. Venture and sufficient investment

As discussed, there are high risks and delays in seeing the results associated with mobilizing the S&T labors and as such, the State is best placed to determine the venture investments required for S&T activities. In Vietnam, the term “subsidizing” has been commonly used over time, which has led to a misunderstanding that the society spends a large amount of money for growing some “social parasites”. However, when considering the significant benefits that S&T research can generate for a society, the investment efforts for S&T activities should be called venture investment. Risk can be minimized if the matter is considered in a global context and sufficient incubation time is allowed for the fundamental ideas to be translated into the final implementations.

The concept of sufficient investment refers to the threshold value at which point ideas turn into reality, and where otherwise they would fail and resources would be wasted. The relative interpretation of sufficient investment depends on the level that the State authorities realize and govern the matter. The experience and history of countries with equivalent economic potential, however, show that the volume of 1.8 - 2.5% of GDP is the critical scale of sufficient investment for S&T [6].

4.4. Longer vision required

All national leaders will be assessed at some point on their history of strategic vision for their nation’s development. In the long history of Vietnam and other nations, the strategic vision of their leaders can be evaluated by the way they respect the talents and invest suitably for creative labor, recognizing that high levels of intellect and knowledge are the most valuable national resources./.

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