



## Overview of Studies on Financial Management Mechanisms for Science and Technology Activities in Vietnam

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### Abstract

*The development of science and technology (S&T) is a crucial matter that has long been considered a top national policy and a driving force for socio-economic growth. Recent changes in policy mechanisms in this field have demonstrated strong, fundamental, comprehensive, and synchronized innovation in management mechanisms, operational mechanisms, and organizational structures. This article explores research materials on financial mechanisms for scientific and technological activities worldwide and in Vietnam. Both global and Vietnamese studies focus on issues related to financial resources and the allocation of these resources for science and technology, financial mechanisms, and the effectiveness of investments in science and technology. Some research in Vietnam concentrates on understanding the results of financial mechanisms on the development of science and technology.*

**Keywords:** overview, financial management mechanisms, science and technology, Vietnam

### 1. Introduction

The development of science and technology is a crucial issue that has long been considered a top national policy and a driving force for socio-economic growth. Recent changes in the policy mechanisms in this field have demonstrated strong, fundamental, comprehensive, and synchronized innovation in management mechanisms, operational mechanisms, and organizational structures. However, these changes have only managed to "unblock" science and technology during the transition phase without sufficiently "boosting" their activities. Therefore, despite some achievements, our country's science and technology activities still have many limitations and have not yet met the requirements to serve the renovation and development of the country in the context of intense globalization. This is becoming an inevitable trend for world development in the new era—the era of the Industrial Revolution 4.0—with the importance of the knowledge economy.

In the management system for science and technology activities, financial management plays a crucial role. Finance is both a resource and a driving force for the development of science and technology. The appropriate allocation and distribution of financial

resources is only one aspect of the issue; the other is having a suitable financial management mechanism built and implemented based on the characteristics of science and technology activities. Over time, following the policies of the party and the state, financial investment in science and technology activities has significantly increased, especially from state budget sources. The financial management mechanism in general, and specifically the state budget expenditure management mechanism for science and technology activities, have gradually been innovated, overcoming difficulties in implementing science and technology activities. The authors group sought to understand an overview of studies on financial management mechanisms in the field of science and technology in Vietnam as well as globally to evaluate the results achieved by previous studies and identify gaps that no author has mentioned yet, serving as a basis for future research.

### 2. Overview of foreign research

(1) *Regarding the funding for science and technology research*

Alfred Le Peng Cheng (2012) explored the financial mechanisms for science and technology, using Taiwan as a practical example. He suggested that, like all countries worldwide, there are three

primary sources of investment for science and technology: the national budget, the private sector (including businesses and individuals), and international or foreign organizations. For developing countries, the main source of funding for science and technology is the national budget, accounting for up to 70%, with the private sector contributing about 27%; foreign organizations provide a relatively small proportion. Regarding who uses funds from the national budget, Taiwan's situation mirrors that of other countries worldwide: Most nations allocate science and technology development funds to universities, scientific research institutes, and government departments. However, any organization or individual who can present and justify a research project's necessity to the National Science Agency can also receive funding to carry it out.

Sandhya, G. D. (2018) has shown that India's R&D spending has increased slowly from 0.75% of GDP in 1990 to 0.88% in 2012.. The primary funding for R&D still predominantly comes from the public sector, with about 54.4% coming from the central government, 7.3% from federal authorities, and the private sector contributing around 28.9%. India aims to boost investment in science and technology from the private sector. To achieve this plan, the Indian government encourages private sector investment in developing science and technology, particularly for innovative changes. The study shows that India's policy focuses on basic research areas such as information technology, electronics, medical devices, biotechnology, space technology, and nano.

#### (2) *Financial mechanism*

Charly.J.'s (2012) study delved into the financial mechanisms for science and technology, illustrated by practical examples from Taiwan. The research explored everything from the funding sources for science and technology activities to how these funds are allocated (primarily public investment) and controlled. In terms of fund allocation, Taiwan currently employs two methods: input-based and output-based allocation, as revealed by the study. However, there's a growing trend toward the latter method. The control of expenditures is carried out in line with these two allocation methods. For input-based allocation, the focus is on whether the expenditure aligns with the input index, meets standards, falls within authority, and has evidence to prove its authenticity. In an output-based budget management system, it's crucial to check if the expenditure achieves the committed or required outputs and is not misused for other purposes or corrupted. However, the study hasn't fully evaluated the advantages and existing issues of these allocation and control methods but merely provides descriptive observations.

#### (3) *Evaluating the effectiveness of investments in science and technology.*

Terry F. Young's (2013) suggested that to effectively operate a financial mechanism for research activities, it's crucial to establish a system of evaluation criteria and a toolkit for assessing the effectiveness of scientific research. This forms the basis for mobilizing investment capital for scientific and technological development research, as well as constructing a spending mechanism for these activities to ensure maximum efficiency.

Amir Piric and Neville Reeve (2015) examined the tools used to evaluate public investment activities in relation to science and technology development. The authors used group discussions and expert interviews in their chosen research location, New Zealand.

The study aims to assess the transparency and public nature of investments as well as spending mechanisms in the fields of science and technology. It emphasizes the evaluation of individual organization choices, methods of assessing research results, and whether financial mechanisms ensure transparency and attract capable scientists to contribute to national programs and key projects. In this context, the study proposes using financial indicators to evaluate projects when making selections and appraising research outcomes.

George Papaconstantinou and Wolfgang Polt (2016) conducted research to evaluate financial policies for scientific and technological innovation activities in Thailand. The research team used a set of research tools independent of Thailand's science and technology development system. The research team focuses on three main issues: (i) policy groups for attracting and expanding investment participants in the field of science and technology; (ii) policy groups for monitoring the spending mechanisms in science and technology activities; and (iii) policy groups for financial distribution in science and technology activities. However, the new research mainly focuses on the macro level; the research has not mentioned the implementation or construction of financial mechanisms at scientific research organizations, especially the proposal group and the authors. The author has not pointed out what conditions and operating models of scientific research organizations are needed to be able to apply and operate the proposed financial mechanism to achieve the expected effectiveness.

### 3. Overview of domestic research

#### (1) *Research on financial sources and allocation of financial resources for science and technology*

The World Bank (2017) has provided an overview of the S&T sector and a picture of public spending on the S&T sector. Accordingly, in recent years, science and technology have been one of the country's top priorities to make a major contribution to the country's sustainable and long-term growth. Vietnam's science and technology industry also shows that it has many development potentials. Nam ranks high in the region in terms of the number of researchers per million people, but has not been invested at an optimal level. Regarding public spending on science and technology, the state budget spent on science and technology basically meets the prescribed rate of 2% of the total annual state budget expenditures. The state budget is the main source of capital for research and development investment, at a rate of 56%. The allocation mechanism for public science and technology organizations has been changed towards more autonomy, but there are still some difficulties in the disbursement of investment capital, especially in some localities that allocate large amounts of state budget to science and technology. There is a mechanism to uniformly monitor the allocation of spending on science and technology vertically to localities and horizontally to different ministries and branches, as well as tax incentive policies for businesses investing in research and development. Development has not had a significant effect.

Dat Khang (2015) suggests that with a budget expenditure of 2% for science and technology research activities, Vietnam belongs to the group of countries with a high rate, even higher than countries with a science and technology background. develop. However, the biggest shortcoming is that Vietnam's total investment spending on

science and technology comes mainly from the state budget, while in countries around the world, investment from outside sources is often 3-5 times even higher. has 10 times more water than the state budget. One of the inadequacies in the financial mechanism described by the author is the paradox of money waiting for money. The author pointed out that most countries in the world use the S&T fund mechanism, reasonable proposals are granted money, and unused spending money is automatically transferred to the next stage. Besides, the issue of norms also needs to be flexible. In research, it is impossible to set norms sparingly and unrealistically, leading to ineffective application of this financial mechanism. The study proposed a number of solutions, including a proposal to pay high salaries to scientists and pilot a mechanism to pay for final products, and the state will buy back S&T products.

Nguyen Thi Nhung (2014) systematized legal regulations as the basis for implementing financial mechanisms for scientific activities. From the research results, the author has evaluated the results achieved by financial policy innovation in science and technology activities, including diversifying mobilized financial sources, increasing investment spending on science and technology in the state budget, and having reasonable policies to increase the mobilization of financial resources for scientific activities. At the same time, the study has pointed out remaining problems after 25 years of implementing science and technology-supported policy innovation. One of the limitations pointed out by the study is: flexibility in implementing policies on the allocation and use of financial resources from the state budget is still poor; the financial mechanism for S&T development has not encouraged and attracted researchers and investors into this field. Specifically, the study has pointed out five remaining issues regarding financial mechanisms as well as financial management mechanisms for science and technology activities.

Le Xuan Truong et al (2014) has affirmed that when discussing innovation in financial management mechanisms for science and technology, it is impossible not to mention the basic contents of the management mechanism. finance. The author has clearly pointed out the basic content of the financial mechanism: financial sources, users of financial resources, and ways to allocate and control financial resources for science and technology. The author proposed the need to learn about experiences from advanced countries, which is necessary for developing countries like Vietnam. In it, the author analyzed and pointed out some characteristics of financial management for scientific research activities in some advanced countries in the world, such as the US, Ireland, Sweden, etc.

Bui Tien Dung (2016) analyzed a number of practical issues with the current financial management mechanism for science and technology activities and, on that basis, proposed financial solutions for science and technology development that need to be promoted. announced in the near future. Specifically, the author pointed out three remaining problems. (i) Investment capital for science and technology has not been expanded, most of which still comes from the state budget; (ii) Financial mechanisms for science and technology activities only focus on the quantitative aspect and not the qualitative aspect of the problem; (iii) Expenditure regulations for scientific research activities still have shortcomings (expenditure norms are too specific and rigid, slow to change, so they are easily outdated; hard regulations do not allow any flexibility compared to the original estimate; the number of

procedures and documents needed to prove that expenditures are valid becomes too large). From that situation, the author has proposed groups of solutions to innovate financial mechanisms for science and technology activities.

Tran Thi Thu Ha (2016) has identified some inadequacies of this mechanism and proposed solutions. According to the author, those shortcomings are: (1) inadequacies in investment resources for science and technology activities, mainly from the state budget; socialization resources from businesses are not high; (2) inadequacies in the allocation of financial resources for science and technology activities; and (3) inadequacies in the effective use of financial resources for science and technology activities. Regarding solutions, the author proposes three groups of solutions. Firstly, on the basis of socializing science and technology activities, it is necessary to continue diversifying financial sources for investment in science and technology; second, innovate the allocation mechanism and increase the effective use of financial resources for science and technology; and third, innovate the salary mechanism for scientists.

Le Thi Thuy Van et al (2020) on the basis of assessing the current status of financial policies for science and technology development in Vietnam in the period 2013–2020 has proposed a number of solutions to improve financial policies for Vietnam's science and technology development. South to 2030. Accordingly, for spending policies, it is necessary to continue to ensure adequate allocation of resources from the state budget for science and technology, focus on allocating the state budget to key projects with spillover effects, and perfect policies. State budget spending policies, while promoting the mobilization of off-budget financial resources; Regarding tax, fee, and charge policies, it is necessary to continue to review and improve the legal corridor, along with appropriate policy mechanisms related to promoting the development of science and technology enterprises and the attraction of resources. investment from society, especially from businesses, in science and technology activities through tax policy tools, and at the same time strengthen propaganda and guidance on tax incentives, fees, charges, and related administrative procedures. important for S&T enterprises; Regarding credit policy, it is necessary to introduce appropriate preferential policies, focusing on funds and policies dedicated to science and technology enterprises such as the National Technology Innovation Fund, the Science and Technology Development Fund of localities, Cut down on administrative procedures.

(2) *Research on the current status of financial management mechanisms for science and technology activities*

Do Nam (2011) has shown that, in the six mechanisms that need to be innovated in science and technology activities (building and organizing the implementation of science and technology tasks; managing science and technology organizations; ensuring finance for science and technology; management of science and technology human resources; support for the development of the science and technology market; and assignment and decentralization of state management of science and technology), the group of financial mechanisms for science and technology activities is managed by ministries, branches, and provinces and cities. Promulgating and implementing by local governments is the group of mechanisms that have the clearest positive impact on local science and technology activities. The author used the case study method in Da Nang City, Ben Tre Province, An Giang, and Thua Thien Hue. One

of the conclusions drawn from the study of the current situation that the author pointed out is that, in addition to concretizing the guidelines, policies, and mechanisms at the central and local levels, it is necessary to supplement and adjust a number of regulations and financial mechanisms suitable to your locality to encourage and attract investment in science and technology in your locality.

Le Dinh Tien (2011) combined qualitative research and specific case studies to clarify the urgent need to innovate state management mechanisms to improve the effectiveness of social science activities. In particular, the financial mechanism mentioned by the author in the research content is very important. The author pointed out the characteristics of social science activities, thereby pointing out inadequacies in the current financial mechanism that limit the effectiveness of social science activities. Since then, the author has proposed a group of specific solutions for innovating the state management mechanism in general and the financial mechanism in particular for social science activities.

Tran Ngoc Hien (2012) has raised new issues in building and implementing science and technology topics and projects, as well as innovating financial mechanisms in research and implementation. The author has raised new arguments for building and implementing science and technology topics and projects: There needs to be a new vision and innovation from the characteristic of "doing then knowing" to "knowing then doing." It is necessary to have an orientation to identify topics to ensure compliance with research requirements for each stage to ensure sustainable development. Encourage dialectical thinking and novelty in research; identify qualified human resources from the beginning to carry out the project. Besides, the author points out the limitations of the financial mechanism, especially emphasizing the cost determination and cost allocation mechanisms. From those limitations, the author has proposed five issues that need innovation in the financial mechanism of science and technology research activities.

Nguyen Truong Giang (2012) pointed out the inadequacies in the financial mechanism for science and technology activities, including: (i) The method of allocating state budgets to science and technology organizations is not linked to product requirements and tasks. scientific product, not yet attached to the final product; (ii) The allocation of the state budget for state-level science and technology activities is carried out according to approved programs and projects, with the Ministry of Science and Technology managing the budget accounting for 77%, leading to limited initiative for direct ministries and branches. continued implementation and enjoyment; (iii) resources outside the state budget have not been fully exploited, especially promoting the role of the National Science and Technology Development Fund; (iv) difficulties in exercising autonomy and self-responsibility in organizing scientific and technological research. From those shortcomings, the author has proposed a group of solutions that focus on the issues of (i) mobilizing and diversifying investment resources; (ii) strengthening decentralization and enhancing the role, responsibility, and autonomy of management ministries, branches, and localities in the management and use of state budget funds; (iii) completing the system of science and technology development funds; and (iv) public transparency and accountability in the use of state budgets in the field of science and technology.

(3) *Research on the results of financial mechanisms for the development of science and technology*

Nguyen Hong Son and his team (2012), the authors highlighted that financial mechanisms are a key factor determining the success or failure of each country's science and technology development strategy. This mechanism determines how much investment will be made in science and technology activities, from which sources, and how it will be invested to yield the highest returns for the economy. From their research, the authors pointed out that one of the main reasons is that Vietnam has not yet established a comprehensive, synchronized financial mechanism for science and technology activities, thus failing to attract the necessary financial resources. At the same time, existing financial resources have not been allocated and used as effectively as desired. The article analyzes some limitations of the current financial mechanism for science and technology activities and proposes solutions to improve this mechanism.

#### 4. The results achieved and the gaps in research on financial management mechanisms for science and technology activities

(1) *A general assessment of the results achieved by the research projects*

Looking at the big picture, it's clear from the research studies published both domestically and internationally related to the thesis topic that theoretically, all research agrees on the significant role of science and technology development in the economic and social growth of most countries worldwide, including Vietnam. Investing in science and technology has a ripple effect on all aspects of economic and social life, which is why it's highly valued in the development strategies of many countries.

In reality, many studies have touched on the source of investment funds for science and technology, the financial management mechanisms for science and technology, and the evaluation of investment effectiveness for science and technology. These studies have analyzed the current situation and proposed solutions to improve the management mechanism of state budget expenditures for science and technology activities.

All the research results published here are important references that the thesis author has inherited and developed. However, the published works show that there are still issues that have not been addressed or are not fully addressed. With this thesis, the author hopes to contribute to filling these gaps.

(2) *The gaps in research*

Firstly, the authors' work primarily focuses on studying the outcomes, effectiveness of science and technology activities, and criteria for evaluating these activities. This includes assessments for selecting and approving projects. Specifically, they've developed criteria for quantifying evaluations, tools for assessing investment policies in science, and proposed methods for evaluating and determining the effectiveness of investments in science and technology. However, these works haven't delved deeply into systematizing the methods and organization of science and technology activities as a basis for research according to each method and content.

Second, the authors' research focuses on two main issues. The first is the financial mechanism for science and technology activities in terms of mobilizing and utilizing capital as a part of the operational mechanism. The second group of studies, while directly addressing financial management mechanisms, often delve into one aspect or content of the financial management mechanism for science and technology. However, there's a lack of research clarifying the characteristics and content of these mechanisms. This makes it challenging to propose substantial scientific arguments for innovating these financial management mechanisms to stimulate domestic science and technology activities. Additionally, studies discussing financial management mechanisms as a component in researching new operational mechanisms for science and technology only touch on general issues. They don't focus on exploring the general state budget management mechanism or specifically the state budget expenditure management mechanism for science and technology activities. Moreover, most studies consider the overall financial management mechanism for science and technology activities without examining its application to different groups within the science and technology sector to identify its suitability or shortcomings if a single model or mechanism is universally applied.

Thirdly, most studies, after identifying the existing issues and shortcomings of the financial mechanism, propose a system of solutions for state budget allocation in science and technology. However, most of these solutions are still quite general, lacking specific and detailed measures that align with the reality of managing the state budget for science and technology activities. This makes it difficult to immediately apply them in practice. For instance, many studies suggest using a science and technology investment fund mechanism, but none have specifically proposed how such a fund should be established, where the funding should come from, or how the financial mechanism should operate. At the same time, since these studies are primarily conducted for a specific period, there is no connection between different periods to provide direction and vision for the medium and long term. Therefore, the proposed solutions are merely "segments" addressing arising issues without any long-term roadmaps for innovating the financial management mechanism for science and technology.

## 5. Conclusion

The article has explored global scientific and technological documents on topics such as: funding sources for science and technology; financial mechanisms for science and technology; and evaluating the effectiveness of investments in science and technology. At the same time, the article also delves into domestic documents related to financial policies for science and technology in aspects like the results of financial mechanisms on the development of S&T, the current state of financial management for S&T activities, funding sources, and allocation for S&T. The findings from this research provide a comprehensive view of financial policies applied to science and technology in Vietnam for future studies. This paves the way for new research directions on this issue.

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