

## Forum: Practical Perspectives

# The mischaracterization of the ST&I funding policy: an analysis of the Brazilian Fund for the Development of Science and Technology

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This study aims to critically analyze the mechanisms that deplete the Brazilian fund for the development of science and technology (FNDCT), jeopardizing its ability to promote economic and social development. Data were extracted from the integrated budget and planning system (SIOP) bases and the budget execution report between 2012 and 2021, made available by the Brazilian funding agency FINEP. The quantitative results indicate a process of “dehydration” due to changes such as the regulation that allows the executive to redirect resources previously earmarked for the fund (called DRU), the formulation of the legislation on the annual budget (PLOA) and the contingency reserves. The qualitative analysis shows a mismatch between the promise of a bold and innovative science and technology policy and a centralized and bureaucratic governance structure. Sectoral funds do not face, on average, problems in raising resources. However, the centralized management subservient to fiscal austerity policies leads to quantitative insufficient budget execution and qualitatively poor diversification. As outcomes, this situation mischaracterizes the ST&I funding policy, failing to comply with the promise of development through innovation.


**Keywords:** ST&I funding policy; FNDCT; budget execution.

### A descaracterização da política de financiamento da CT&I: uma análise do FNDCT

Este estudo tem como objetivo analisar criticamente os mecanismos que desidratam o Fundo Nacional de Desenvolvimento Científico e Tecnológico (FNDCT), debilitando-o na sua função de promover o desenvolvimento econômico e social. Os dados foram extraídos das bases do sistema integrado de orçamento e planejamento (SIOP) e do relatório de execução orçamentária, entre 2012 e 2021, disponibilizados pela financiadora de estudos e projetos (FINEP). Os resultados da investigação apontam que, do ponto de vista quantitativo, há um processo de desidratação, por mecanismos como a desvinculação de receitas da união (DRU), a formulação do projeto de lei orçamentária anual (PLOA) e as reservas de contingência. Do lado qualitativo, há descompasso entre a promessa de uma política arrojada e inovadora e uma estrutura de governança centralizada e burocrática. Os fundos setoriais não enfrentam problemas de arrecadação, mas a gestão centralizada e subserviente a políticas fiscais de austeridade leva a uma execução orçamentária quantitativamente insuficiente e qualitativamente pobre em diversificação, quadro que descaracteriza a política de financiamento de ciência, tecnologia e inovação (CT&I), deixando de cumprir a promessa de desenvolvimento via inovação.

**Palavras-chave:** política de financiamento de CT&I; FNDCT; execução orçamentária.


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## La descaracterización de la política de financiación de CT&I: un análisis del FNDCT

Este estudio tiene como objetivo analizar críticamente los mecanismos que deshidratan el fondo nacional de desarrollo científico y tecnológico (FNDCT), debilitándolo en su función de promover el desarrollo económico y social. Los datos fueron extraídos de las bases del sistema integrado de planificación y presupuesto y del informe de ejecución presupuestaria entre 2012 y 2021, puestos a disposición por la financiadora de estudios y proyectos. Los resultados de la investigación indican que, desde el punto de vista cuantitativo, existe un proceso de deshidratación, a través de mecanismos como la Desvinculación de Ingresos de la Unión Federal, la formulación del proyecto de ley presupuestaria anual y las reservas de contingencia. En el aspecto cualitativo, existe un desajuste entre la promesa de una política audaz e innovadora y una estructura de gobierno centralizada y burocrática. Los fondos sectoriales no enfrentan, en promedio, problemas de recaudación, pero la gestión centralizada supeditada a políticas fiscales de austeridad conduce a una ejecución presupuestaria cuantitativamente insuficiente y cualitativamente pobre en términos de diversificación, situación que descaracteriza la política de financiamiento para la ciencia, tecnología e innovación (CT&I), incumpliendo con la promesa de desarrollo a través de la innovación.

**Palabras clave:** política de financiamiento para CT&I; FNDCT; ejecución presupuestaria.

### 1. INTRODUCTION

The Brazilian government has developed funding mechanisms for science, technology, and innovation (ST&I), which were expected to foster endogenous forms of economic development driven by innovation. One of the main funding mechanisms for the national ST&I system is the National Fund for Scientific and Technological Development (FNDCT), created in 1969 and operated by the Financing Agency for Studies and Projects (Finep). FNDCT's goal is to provide financial support to national priority projects and programs for scientific and technological development. It is made up of sectoral funds, fueled by tax and parafiscal revenues from specific economic sectors, to finance specific innovation actions. It is also made up of transversal funds, designed to stimulate university-company interaction (CT-Verde Amarelo) and the innovation infrastructure of Science and Technology Institutions (CT-Infra).

The resources raised for ST&I, especially by sectoral funds, as they are directed to key sectors in the national ST&I strategy, should be fully applied in the research activities they are intended for. However, Moraes (2008), Queiroz and Cavalcante (2012), and Leal, Teixeira, and Moreira (2020) argue that the resources applied by sectoral and transversal funds, since their inception, do not correspond to the amounts collected. Therefore, this study's objective is to present and describe the mechanisms that dehydrate sectoral funds, weakening their function of fostering ST&I development. We chose these funds as the empirical focus of the research because they indicate an innovative policy, created to secure financing for innovation.

The assessment had two dimensions. The first was quantitative and focused on FNDCT's budget execution. Data were extracted from the federal government's Integrated Budget and Planning System (SIOP) and from budget execution reports of sectoral funds, between 2015 and 2021, made available by Finep and updated by the Broad National Consumer Price Index (IPCA). The second dimension was qualitative and examined FNDCT's management mechanisms, whose sources were the corresponding regulations and other studies, which were important for showing how and why decisions were made on the use of resources. The article begins with a brief history of FNDCT, and next presents and discusses the dehydration mechanisms, regarding the two dimensions.

## 2. LEGAL FRAMEWORKS AND SOURCES OF REVENUE FOR SECTORAL AND TRANSVERSAL FUNDS

The legal instruments that support the allocation of specific resources to sectoral and transversal funds that comprise FNDCT were approved between 1998 and 2012, as shown in Chart 1. The first sectoral fund, CT-Petro, was created to ensure investments in innovation projects exclusively for the oil and natural gas production chain in Brazil.

Between 2000 and 2004, several of these funds were created to secure research resources for sectors such as energy, land transportation, water resources, mineral extraction, aerospace, IT, aeronautics, biotechnology, agribusiness, health, and water transportation, as well as for the development of the Amazon. In 2012, the CT-Inovar-Auto was set up, oriented to companies of the automotive sector, such as automakers and distributors. However, as it was a counterpart to the tax waiver policy, it was terminated in 2019. In addition to sectoral funds, two transversal funds were created: CT-Verde Amarelo, in 2000 (for university-company cooperation), and CT-Infra (for infrastructure), in 2001.

**CHART 1 LIST OF SECTORAL FUNDS, IN ORDER OF CREATION**

Fund	Creation/start of operation	Source of revenue
CT-Petro (oil and natural gas)	Decree No. 2,851 (1998)	<ul style="list-style-type: none"> <li>• 25% of the portion of royalties that exceeds 5% of oil and natural gas production.</li> </ul>
CT-Energia (energy)	Law No. 9,991 (2000) and Decree No. 3,86 (2001)	<ul style="list-style-type: none"> <li>• 4% of the financial compensation paid to the Union for the use of water resources, equivalent to 7% of the value of the energy generated.</li> </ul>
CT-Transporte Terrestre (land transportation)	Law No. 9,992 (2000) and Decree No. 4,324 (2002)	<ul style="list-style-type: none"> <li>• 10% of the revenue collected by the National Department of Highways (DNER) from contracts signed with telephone companies, communications companies, and the like, which use the Union's infrastructure of land transportation services.</li> </ul>
CT-Recursos Hídricos (water resources)	Law No. 9,993 (2000) and Decree No. 3,874 (2001)	<ul style="list-style-type: none"> <li>• 4% of the financial compensation currently collected by electricity generating companies, equivalent to 6% of the value of electricity generation production.</li> </ul>
CT-Mineral (minerals)	Law No. 9,993 (2000)	<ul style="list-style-type: none"> <li>• 4% of the financial compensation paid to the Union for the use of water resources, equivalent to 7% of the value of the energy generated.</li> </ul>
CT-Espacial (space)	Law No. 9,994 (2000) and Decree No. 3,915 (2001)	<ul style="list-style-type: none"> <li>• 25% of the revenue received by the Union from commercial launches of satellites and rockets for scanning Brazilian territory.</li> <li>• 25% of the revenue received by the Union from trading data and images obtained by tracking, tele-measurement, and control of rockets and satellites.</li> <li>• The total revenue earned by the Brazilian Space Agency (AEB) from granting licenses and authorizations.</li> </ul>

*Continue*

Fund	Creation/start of operation	Source of revenue
CT-Verde-Amarelo (university-company interaction)	Law No. 10,168 (2000) and Decree No. 4,195 (2002)	<ul style="list-style-type: none"> <li>• Training, Insertion, and Development (Cide): 10% on taxable events.</li> </ul>
CT-Informática (informatics)	Law No. 10,176 (2001)	<ul style="list-style-type: none"> <li>• A minimum of 0.5% of the gross revenue of companies whose purpose is to produce IT goods and services manufactured at the Manaus Free Trade Zone.</li> </ul>
CT-Amazônia (Amazon)	Law No. 10,176 (2001)	<ul style="list-style-type: none"> <li>• A minimum of 0.5% of the gross revenue of companies whose purpose is to produce IT goods and services manufactured at the Manaus Free Trade Zone.</li> </ul>
CT-Infra (infrastructure)	Law No. 10,197 (2001) and Decree No. 3,807 (2001)	<ul style="list-style-type: none"> <li>• FNDCT resources from Cide, from financial compensation for the use of natural resources, from the percentage of revenue or profit of concessionaires, permissionaires, and authorizers of public services, in addition to contracts signed by the Union, by its autarchies and foundations.</li> </ul>
CT-Aeronáutico (aeronautics)	Law No. 10,332 (2001)	<ul style="list-style-type: none"> <li>• 7.5% of Cide.</li> </ul>
CT-Biotecnologia (biotechnology)	Law No. 10,332 (2001)	<ul style="list-style-type: none"> <li>• 7.5% of Cide.</li> </ul>
CT-Agronegócio (agribusiness)	Law No. 10,332 (2001)	<ul style="list-style-type: none"> <li>• 17.5% of Cide.</li> </ul>
CT-Saúde (health)	Law No. 10,332 (2001)	<ul style="list-style-type: none"> <li>• 17.5% of Cide.</li> </ul>
CT-Transporte Aquaviário (water transportation)	Law No. 10,893 (2004)	<ul style="list-style-type: none"> <li>• 3% of the revenue from the Additional Freight for the Renewal of Merchant Marine (AFRMM) that falls to the Merchant Marine Fund (FMM).</li> </ul>
CT-Inovar-Auto (terminated)	Law No. 12,715 (2012) and Decree No. 7,819 (2012)	<ul style="list-style-type: none"> <li>• Counterparties from companies qualified for Inovar-Auto by calculating resources derived from presumed credit from the Tax on Industrialized Products (IPI).</li> </ul>

**Source:** Elaborated by the authors.

Taking stock of the results of these sectoral funds' creation processes, we highlight that the drive for some of them was indirect, based on legal changes that made markets such as oil, electricity generation, and information technology more flexible. The financial compensations paid by private companies that take over these flexible or privatized spaces, or even royalties from private agents' exploitation of public resources are the income sources for innovation development funds, in these same sectors or at the Manaus Free Trade Zone (Amazon Fund). Sectoral funds collect and apply resources in the same economic sector, while the resources for transversal funds come from FNDCT.

### 3. THE ANATOMY OF FNDCT DEHYDRATION

This section shows that, between the generation of expected revenue by the different legal frameworks and the effective application of resources, there are significant cuts of different kinds that dehydrate the ST&I policy. It is divided into a quantitative dimension, where we analyzed FNDCT collection and budget execution, and a qualitative dimension, which examines aspects of FNDCT management.

The collection comprises financial resources transferred by the National Treasury and FNDCT own funds, obtained from return on loans. Their sum increased FNDCT annual availability for investment from R\$ 7.44 billion, in 2012, to R\$ 10.3 billion, in 2021. During the analyzed period, the fund extended its source of own resources from R\$ 222 million, in 2012, to R\$ 2.56 billion, in 2020, a 1,057% increase, totaling a R\$ 9.47 billion own collection. A detailed analysis by type of fund shows that three of them (CT-Infra, CT-Verde Amarelo, and CT-Petro) accounted for 63% of FNDCT revenue, from 2012 to 2021. The transversal funds increased their share from 36%, in 2012, to 48% in 2021, while sectoral funds decreased from 63%, in 2012, to 52% in 2021, of FNDCT total revenue. Therefore, with regard to collection, there was a shift towards transversal funds.

In the historical series analyzed, the years 2015, 2016, and 2017 showed a decrease in money collection, with an average of R\$ 5.4 billion collected by funds. In 2018, FNDCT recovered its capacity of raising funds, considering the total resources collected, reaching the highest annual amount (R\$ 10.3 billion) available for ST&I projects in 2021. Hence, resource availability, regarding revenue, has not been an obstacle for FNDCT financing ST&I policies.

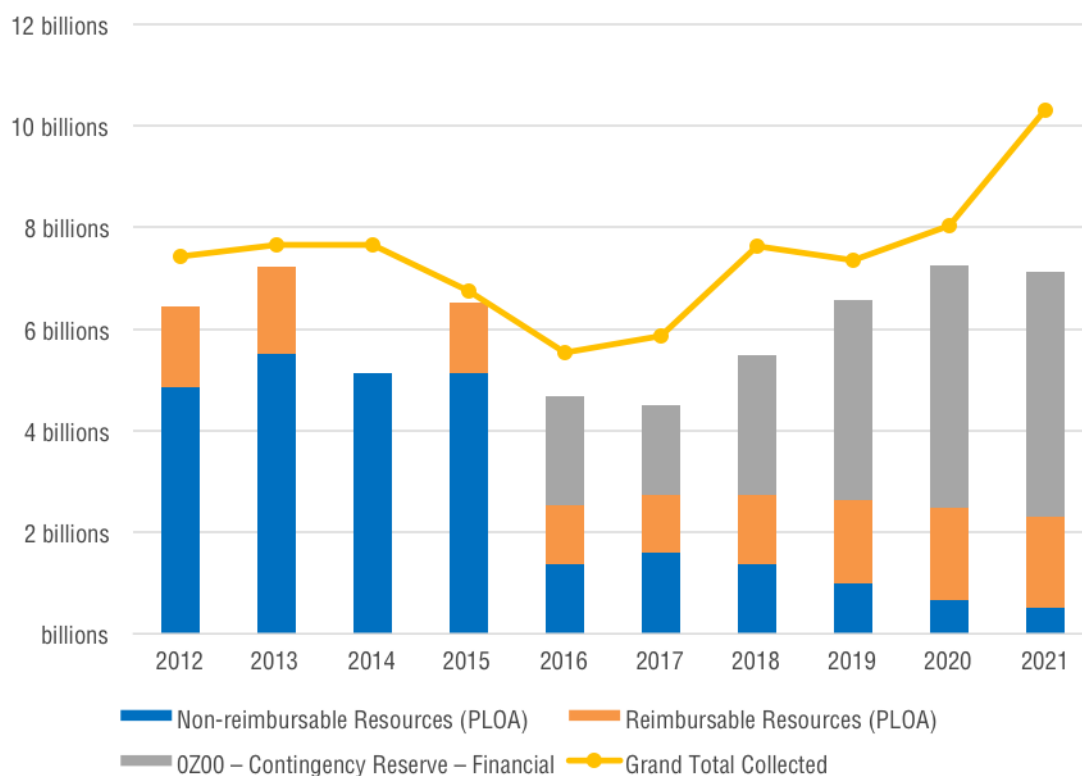
These resources could be even greater, considering that the first moment of FNDCT dehydration occurs in the collection phase, due to the incidence of the Decoupling of Union Revenues (DRU). According to Leal et al. (2020), Constitutional Amendment No. 42/2003 introduced the decoupling of 20% of the resources allocated to the fund by the legislation of ST&I sectoral programs, while Constitutional Amendment No. 93/2016 raised the percentage to 30%. Between 2012 and 2021, the incidence of DRU removed R\$ 16.1 billion in revenue for ST&I funding, which meant loss of revenue, money that was not transferred to the fund for further investment.

The analysis of budget execution considered the total resources managed by FNDCT, divided in two budget units (BU): BU 74,910 - resources under FNDCT supervision (reimbursable) - and BU 24,901 - FNDCT (non-reimbursable). The non-reimbursable funds are oriented to projects from scientific and technological institutions (ICTs) and to cooperation between ICTs and companies, to economic subsidies for firms, to equalize financial charges on credit operations, and to programs developed by social organizations. Reimbursable resources are oriented to companies' technological development projects, as a loan to Finep, with capital injection as an alternative incentive for impact projects (Lei nº 11.540, 2007).

The second moment of FNDCT dehydration was identified at the stage of preparing the Annual Budget Bill (PLOA). Graph 1 shows that only at the beginning of the historical series, in 2012, 2013, and 2015, PLOA values were similar to those collected. The Federal Accounting Court (TCU), in Appellate Decision No. 500, of 2015, pointed out that collected revenues were not considered in PLOA, and recommended that the Ministries of Science, Technology and Innovation, of Finance, and of Planning, Budget, and Management should use "the estimated revenue collection from sectoral funds and their respective sources of funds exclusively and entirely for the preparation of FNDCT future budget proposals, contained in BU 24,901" (Acórdão TCU nº 500, 2015). This recommendation is

still ignored, and cuts have increased since 2016, especially in non-reimbursable resources. In 2021, PLOA estimated only 22% of the total amount of FNDCT revenues for application in the two BUs.

**GRAPH 1 COMPARISON BETWEEN COLLECTED VALUES BY RESOURCE TYPE AND THE EXPENDITURE PROJECTION OF FNDCT ON PLOA**



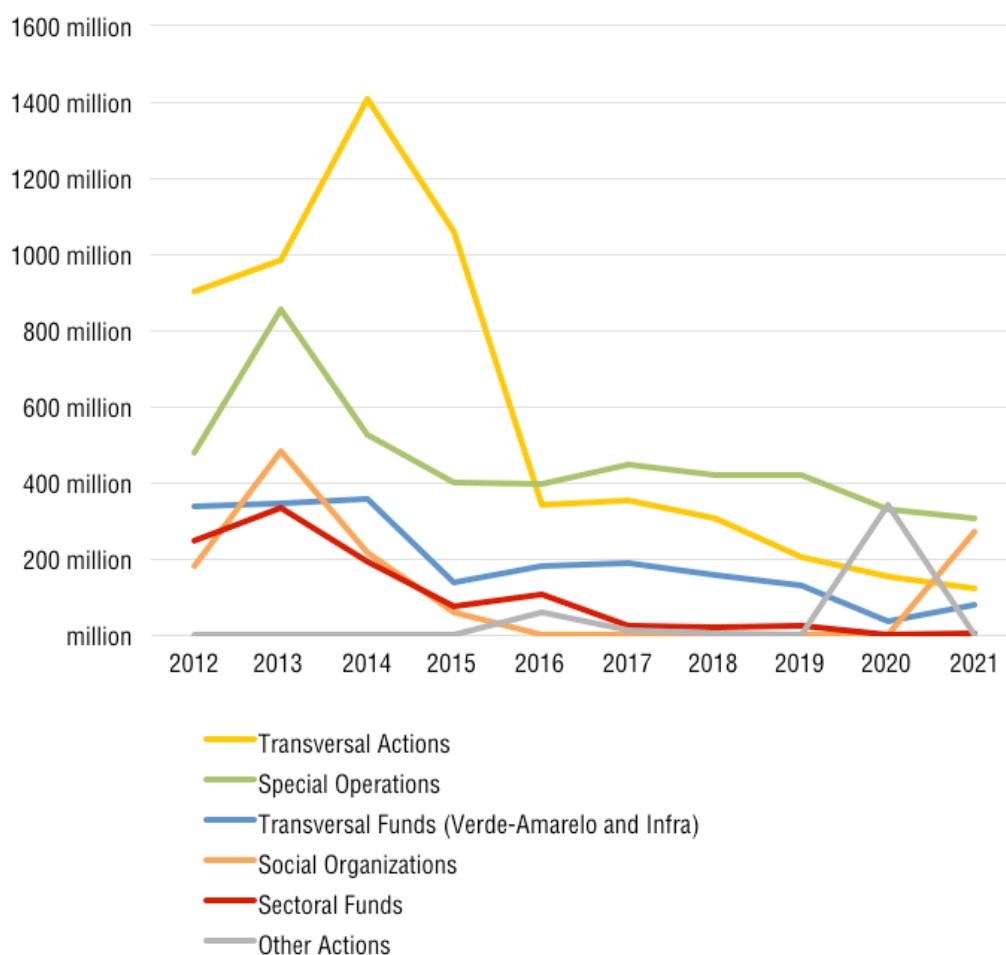
**Source:** Based on SIOP data and corrected by IPCA of December 2021.

Resource contingency was the third moment of fund dehydration and considered one of the major barriers to FNDCT financing of ST&I policies, under Complementary Law No. 177/2021 (Koeller & Rauen, 2021; Leal et al., 2020; Negri & Koeller, 2019). The financial contingency reserve amounted to R\$ 17.9 billion, from 2012 to 2021. The approval prevented the allocation of FNDCT resources to contingency reserves of primary and financial nature. However, when the 2021 LOA (Annual Budget Law) was passed, the Bolsonaro administration blocked more than R\$ 5 billion from FNDCT.

The suspension was denounced to TCU and only a partial release of R\$ 2.2 billion was achieved in that year. Therefore, even with the legal prohibition, the blocking occurred without any kind of legal or administrative penalty to the government, which highlights the vulnerability of ST&I funding. The suspension data show that it is in the implementation stage that budget cuts are most evident (Negri & Koeller, 2019). In 2021, budget forecast for reimbursable resources was twice that of the previous year, when R\$ 3.67 billion were expected. However, only 22% of that total was actually spent, through Finep loans for companies' investment in innovation projects.

Another problem identified at implementation is the way non-reimbursable funds are distributed, shown in Graph 2, since the resources are not directed to sectoral funds. There has been a stronger reduction in the execution of vertical sector funds. In 2021, only R\$ 3.5 million were spent, distributed among seven funds, representing 0.46% of the total paid by BU 2,4901, and 0.09% of the total collected by vertical sector funds in that year. Investment spreading was already the subject of two TCU appellate decisions (Acórdão TCU nº 3.440, 2013; Acórdão TCU nº 1.237, 2019), where rapporteurs pointed out that “the lack of FNDCT specific guidelines enables financing many projects with different goals, at the expense of projects more aligned with the fund’s purposes and, therefore, with the national ST&I strategy” (Acórdão TCU nº 1.237, 2019).

**GRAPH 2 ANALYSIS OF THE DISTRIBUTION OF FNDCT’S NON-REIMBURSABLE RESOURCES, BY TYPE OF ACTION**



Source: Based on SIOP data and corrected by IPCA of December 2021.



Graph 2 also shows that transversal actions, such as Fostering Research and Development in Basic and Strategic Areas, and other actions, like promoting scientific and technological projects and supporting scientific events, among others, also faced significant cuts in budget execution in 2021, when compared to the beginning of the historical series in 2012, which totaled 87% and 54% of paid resources, respectively. The increase observed in other actions in 2020 corresponds to R\$ 339 million assigned for financing projects to handle the public health emergency resulting from the COVID-19 pandemic. These systematic cuts, especially from 2015 onwards, combined with the cuts in resources for investments in ICTs, represent a setback in keeping and improving the national ST&I infrastructure.

The quantitative dimension showed that FNDCT dehydration has increased in the last 10 years, and that the resources collected are not sufficient to fund ST&I projects. Table 1 summarizes the stages and forms of dehydration, shows the anatomy of cuts, and the budget stages in which ST&I policies lost most funding.

**TABLE 1 ANATOMY OF BUDGET CUTS IN FNDCT FUNDING (R\$)**

	Implementation Stages	2012	2021	Accumulated variation from 2012 to 2021	Accumulated value from 2012 to 2021	% of grand total collected by FNDCT
Collection	DRU	1.4 billion	2.3 billion	62.3%	16.1 billion	-
	Sectoral Funds Collection	7.2 billion	7.7 billion	7.09%	64.7 billion	-
	Return from FINEP	222 thousand	2.56 billion	156%	9.48 billion	-
	Total effectively collected	7.44 billion	10.3 billion	38.4%	74.18 billion	-
Budget Execution	PLOA	6.64 billion	2.29 billion	-181%	40.73 billion	55%
	Contingency Reserve	0	4.8 billion	-	17.9 billion	24%
	Paid execution	4.28 billion	1.55 billion	-63.7%	28.9 billion	38.96%

Source: Based on SIOF data and corrected by IPCA of December 2021.

Table 1 shows that the process of dehydration began at the collection stage, when the Fund lost R\$ 16.1 billion because of DRU, which could represent a total budget of R\$ 90.28 billion. However, only R\$ 74.18 billion came to the fund, and of this total R\$ 28.9 billion were actually spent; that is, only 38.96% of the total resources available between 2012 and 2021. Contingency reserves withdrew R\$ 17.9 billion from FNDCT in the analyzed period. These data strengthen Koeller and Rauen’s (2021) argument, that the mismatch between FNDCT collection and execution indicates that the fund’s initial intention of securing resources for ST&I policies did not materialize.

Regarding the qualitative dimension, documentary analysis showed that the assessment of FNDCT investments needs improving. TCU Appellate Decision 1,237/2019 (Acórdão TCU 1.237, 2019),



the result of an operational audit by MCT&I, suggests that Finep needs to implement a method for evaluating the Fund's results and impacts, even though the agency establishes product and process indicators in its programs.

For Corder (2008), Moraes (2008), and Queiroz and Cavalcante (2012), the sectoral funds policy created a new institutional framework for the Science and Technology field and was itself an innovation compared to previous funding mechanisms. On the other hand, this new institutional framework did not increase the amount of resources invested (Moraes, 2008), nor diversified existing funds into new lines and agents different from the previous model, which had a linear-supplier nature (Queiroz & Cavalcante, 2012). In that model, innovation is the result of linear stages, where knowledge production follows a sequence, from basic to applied science and then to development and production. Although some innovations in lines and programs have been introduced, from the perspective of budget execution they remained in a marginal position, compared to reimbursable loans for companies and non-reimbursable programs for research projects, which are mostly academic.

When analyzing FNDCT governance system, Leal et al. (2020) found an increased discretion in the execution of Fund's resources, through transversal actions. One of the reasons is the centralization of decisions in committees and commissions dominated by the federal government, with no representation from sub-national entities and a low presence of the scientific and business sectors, thus disqualifying the mixed management system planned at Sectoral Funds' origin (Corder, 2008; Leal et al., 2020).

The innovative political-institutional arrangement designed as sectoral funds were created was disfigured, in addition to the reorganization of FNCDT in 2007, through Law No. 11,540 (Lei nº 11.540, 2007), losing society's representation for the benefit of the government, and, in this particular case, without sub-national representation. The consequence was the bureaucratization of decision-making bodies, which have become hostages to fiscal policies of continuous blockings in different governments; the inability to meet federal equalization guidelines; and subject to misuse in applications, as mentioned by control bodies themselves.

Finep's publication of the 2019 FNDCT Report is an indication of the low innovative pattern of S&T funding, since only 60% of the amount contracted was actually disbursed; three-quarters of the amounts paid were reimbursable, in the form of credit; 85% of the non-reimbursable amount paid was for ICTs and scholarships; and 7.5% of the amount contracted was for interactions between ICTs and companies.

Few credit lines are disruptive in terms of innovation, such as the so-called pioneering innovation - 15 active projects in the portfolio in 2022 - and only one invests consistently in companies' permanent R&D structure, called 'innovation for competitiveness' - with 10 active projects in the portfolio in 2022. Even regarding the private sector, there is a regional concentration and by companies' size, classified by Finep itself as large or medium-large. Among the projects finished in 2019, 77% of the number of operations and 79% of the value went to companies of these sizes. As for regional concentration, 91% of the operations were in the Southeast and South regions, which accounted for 83% of the total amount disbursed.

#### 4. FINAL REMARKS

There is a process of dehydration whose complete anatomy this article sought to describe and analyze critically, in the light of its own data collection. The privileged and almost mythical position of innovation as the engine of development, which has marked not only the political speech of the last few decades, but also the legal frameworks and policy guidelines in S&T, has not unfolded into an effective and sufficient budget execution to manage a delayed and dependent economic matrix.

The presented data show that, on average, sectoral funds are not facing collection problems, but are suffering from a process of dehydration dictated by a fiscal policy of austerity that has held the national economy hostage to financialization. Although the general S&T budget has increased in relation to Gross Domestic Product (Koeller & Rauen, 2021), the percentage of budget's non-execution has also risen, showing the same levels of application as before sectoral funds' creation.

Complementary Law No. 177/2021 (Lei Complementar nº 177, 2021) led to an increase in reimbursable and non-reimbursable resources settled in the 2022 FNDCT budget execution, but the amount paid still represents a portion of LOA's projected resources. Hence, there is a total mischaracterization of the ST&I financing policy designed after FNDCT creation, so that the organization based on specific funds with their own revenue and application is deconstructed in budget execution, which blocks most of the resources and spreads the leftovers among transversal actions, at the discretion of a centralized management system, without planning and an effective assessment.

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