Systematic resource mobilization for innovation: evidence from FINEP in Brazil (2002-2023)

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Article

Systematic resource mobilization for innovation: evidence from FINEP in Brazil (2002-2023)

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Abstract

This article examines long-term access to public innovation funding in Brazil by analysing how different organizational types mobilize FINEP-funded resources between 2002 and 2023. Drawing on a longitudinal dataset of 30,157 projects financed by *Financiadora de Estudos e Projetos* (FINEP) within the broader framework of the *Fundo Nacional de Desenvolvimento Científico e Tecnológico* (FNDCT), Brazil's principal federal innovation funding mechanism, the study investigates how systematic resource mobilization for innovation varies across organizational types over time and across changing political and fiscal contexts. The study introduces the concept of Systematic Resource Mobilization for Innovation (SRM-I) to analyse the sustained capacity to access, absorb, and execute public innovation resources over time. To operationalize this concept, it develops a composite SRM Index based on project frequency, temporal continuity, and cumulative funding volume. The analysis compares organizational types in the FINEP database, including private firms, public agencies, universities, and university support foundations. Results show that support

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foundations affiliated with public universities exhibit significantly higher levels of continuity, scale, and persistence than other organizational types across successive government administrations, from the expansionary periods of the Lula and Dilma governments to the fiscally restrictive Temer administration and the market-oriented Bolsonaro period. Overall, the findings suggest that SRM-I reflects a path-dependent organizational capability shaped by execution modality and long-term embeddedness in the funding system. In this context, university support foundations emerge as key intermediary organizations for sustaining continuity in public innovation funding across political and fiscal cycles.

Keywords: innovation funding, innovation policy, FINEP, university support foundations, universities.

Mobilização sistemática de recursos para a inovação: evidências da FINEP no Brasil (2002-2023)

Resumo

Este artigo examina o acesso de longo prazo ao financiamento público à inovação no Brasil, analisando como diferentes tipos organizacionais mobilizam recursos financiados pela FINEP entre 2002 e 2023. Desenvolvido a partir de uma base longitudinal composta por 30.157 projetos financiados pela Financiadora de Estudos e Projetos (FINEP), no âmbito do Fundo Nacional de Desenvolvimento Científico e Tecnológico (FNDCT), principal mecanismo federal brasileiro de financiamento à inovação, o estudo investiga como a mobilização sistemática de recursos para inovação varia entre diferentes tipos organizacionais ao longo do tempo e em distintos contextos políticos e fiscais. O estudo introduz o conceito de Mobilização Sistemática de Recursos para Inovação (SRM-I) para analisar a capacidade sustentada de acessar, absorver e executar recursos públicos de inovação ao longo do tempo. Para operacionalizar esse conceito, desenvolve-se o Índice SRM, baseado na frequência de projetos, na continuidade temporal e no volume acumulado de financiamento. A análise compara os tipos organizacionais presentes na base da FINEP, incluindo empresas privadas, órgãos públicos, universidades e fundações de apoio universitário. Os resultados mostram que as Fundações de Apoio das Universidades Públicas apresentam níveis significativamente mais elevados de continuidade, escala e persistência do

que os demais tipos organizacionais ao longo de sucessivas administrações governamentais, desde os períodos expansionistas dos governos Lula e Dilma até a administração Temer, marcada por restrições fiscais, e o período Bolsonaro, orientado por uma agenda mais pró-mercado. De modo geral, os achados sugerem que a SRM-I reflete uma capacidade organizacional dependente da trajetória, moldada pela modalidade de execução e pelo enraizamento de longo prazo no sistema de financiamento. Nesse contexto, as fundações de apoio emergem como organizações intermediárias-chave para sustentar a continuidade do financiamento público à inovação ao longo de ciclos políticos e fiscais.

Palavras-chave: financiamento à inovação, política de inovação, FINEP, fundações de apoio, universidades.

Movilización sistemática de recursos para la innovación: evidencias de la FINEP en Brasil (2002-2023)

Abstract

Este artículo examina el acceso de largo plazo al financiamiento público a la innovación en Brasil, analizando cómo diferentes tipos organizacionales movilizan recursos financiados por FINEP entre 2002 y 2023. Desarrollado a partir de una base longitudinal compuesta por 30.157 proyectos financiados por la Financiadora de Estudos e Projetos (FINEP), en el ámbito del Fundo Nacional de Desenvolvimento Científico e Tecnológico (FNDCT), principal mecanismo federal brasileño de financiamiento a la innovación, el estudio investiga cómo la movilización sistemática de recursos para la innovación varía entre diferentes tipos organizacionales a lo largo del tiempo y en distintos contextos políticos y fiscales. El estudio introduce el concepto de Movilización Sistemática de Recursos para la Innovación (SRM-I) para analizar la capacidad sostenida de acceder, absorber y ejecutar recursos públicos de innovación a lo largo del tiempo. Para operacionalizar este concepto, se desarrolla el Índice SRM, basado en la frecuencia de proyectos, la continuidad temporal y el volumen acumulado de financiamiento. El análisis compara los tipos organizacionales presentes en la base de FINEP, incluyendo empresas privadas, organismos públicos, universidades y fundaciones de apoyo universitario. Los resultados muestran que las Fundaciones de Apoyo de las Universidades Públicas presentan niveles significativamente más elevados de continuidad, escala y persistencia que los demás tipos organizacionales a lo largo de sucesivas

administraciones gubernamentales, desde los períodos expansionistas de los gobiernos de Lula y Dilma hasta la administración Temer, marcada por restricciones fiscales, y el período Bolsonaro, orientado por una agenda más pro-mercado. En términos generales, los hallazgos sugieren que la SRM-I refleja una capacidad organizacional dependiente de la trayectoria, moldeada por la modalidad de ejecución y por el arraigo de largo plazo en el sistema de financiamiento. En este contexto, las fundaciones de apoyo emergen como organizaciones intermediarias clave para sostener la continuidad del financiamiento público a la innovación a lo largo de ciclos políticos y fiscales.

Palabras clave: financiamiento a la innovación, política de innovación, FINEP, fundaciones de apoyo universitário, universidades.

1. INTRODUCTION

Public Innovation Funding plays a pivotal role in driving economic growth, societal well-being, and global competitiveness. In emerging economies where private-sector engagement in R&D is often limited, public policy plays a fundamental role in shaping National Innovation Systems (NIS) funding resources by supporting research, technology diffusion, and institutional coordination (Cassiolato & Lastres, 2008; Cimoli et al., 2020; Lundvall, 2010; Mazzucato, 2013; Nelson, 1993). In Brazil, over the past two decades, the main federal innovation agency, FINEP (*Financiadora de Estudos e Projetos*), through FNDCT (*Fundo Nacional de Desenvolvimento Científico e Tecnológico*) has allocated more than BRL 87 billion (adjusted for inflation) to 30,157 projects, targeting private firms, public agencies, and public and private universities.

Despite a substantial literature on innovation policy (Borrás & Edquist, 2013; Edquist, 2011; Mazzucato, 2013), national innovation systems (Cassiolato & Lastres, 2008; Lundvall, 2010; Nelson, 1993), and governance intermediaries (Caloffi et al., 2023; Dagnino & Velho, 1998; Howells, 2006; Kuhlmann & Rip, 2018), existing studies do not adequately explain which type of organizations are able to sustain access to public innovation funding over long periods and across changing political and fiscal contexts. Most previous work has focused either on policy design, on the regional distribution of funding at specific moments in time, or on the general role of intermediary organizations in innovation systems. Much

less attention has been paid to which organizations repeatedly access, absorb, and execute public innovation resources over time. According to this research gap, this study addresses the following research question: *How does systematic resource mobilization for innovation vary across organizational types over time and across political and fiscal cycles in Brazil?* To capture this differentiated capacity, we introduce the concept and measurement of Systematic Resource Mobilization for Innovation (SRM-I), defined as the sustained ability to mobilize public innovation funding across changing political and fiscal contexts. The concept and indicators are detailed in section 2.3 of the article. In empirical terms, the article operationalizes this concept through a composite index analyzed longitudinally in the FINEP funding open database between 2002 and 2023, to support findings.

The article makes three contributions. First, it advances the literature by shifting attention from one-off funding outcomes to analyzing the longitudinal organizational capacity to sustain engagement with public innovation instruments over time. Second, it introduces SRM-I as an analytical framework for examining this form of sustained funding mobilization. Third, it provides original longitudinal evidence that university support foundations (*in Brazilian Portuguese: fundações de apoio)* exhibit systematically stronger patterns of continuity, scale, and persistence for FINEP funding than other organizational arrangements in the Brazilian public innovation funding system. More broadly, the article analyzes that the university–foundation nexus is not merely an administrative structure, but a central mechanism in the sustained mobilization of public innovation resources, creating interfaces between innovation policy and innovation execution. The findings therefore contribute to ongoing debates on innovation governance, policy implementation, and organizational resilience in public funding systems.

2. THEORETICAL FRAMEWORK

2.1 The financing of National Innovation Systems

The National Innovation Systems (NIS) framework conceptualizes innovation as the result of complex interactions among firms, universities, government agencies, and intermediary institutions (Lundvall, 2010; Nelson, 1993). In Latin America, the NIS approach has been

adapted to account for structural asymmetries, limited private-sector engagement in R&D, and a historically central role of the state (Albuquerque et al., 2015; Cassiolato & Lastres, 2008). The role of technological innovation and knowledge activities, such as R&D, is central in traditional approaches to innovation systems, but the financing of these systems still receives little theoretical and empirical attention, especially in the context of developing countries (Tavares et al., 2023). Innovation financing is a central component of national innovation systems and depends on the interaction between the State, financial institutions, and macroeconomic policies to promote long-term development (Kahn et al., 2014).

Some studies have focused on the role of the State in financing National Innovation Systems (NIS) (Kahn et al., 2014; Pamplona & Yanikian, 2015; Santana, et al., 2021; Tavares, 2024). Studies on the Brazilian NIS show that the system is predominantly dependent on public funding, mainly through institutions such as ministries, federal agencies, and development banks (Pamplona & Yanikian, 2015; Santana, at. al, 2021, Tavares, 2024). This characteristic of innovation financing in Brazil makes the availability of resources vulnerable to changes in government and crises, that is, strongly dependent on political and economic factors, and lacking institutional mechanisms that guarantee continuity of funding (Tavares, 2024). Studies that specifically examined FINEP identified weaknesses such as inconsistency in the pattern of funding, the diffuse distribution of resources, low agency autonomy, and the difficulty small and medium-sized firms face in accessing resources (Pamplona & Yanikian, 2015), as well as a regional concentration in the distribution of resources directed to firms (Santana et al., 2021). However, there are no studies that discuss which type of organizations maintain consistency in attracting resources over time, overcoming fluctuations in the political and economic scenario.

These characteristics of the Brazilian innovation financing system raise an important analytical question. If public support for innovation is marked by political, fiscal, and institutional instability through time, which organizations are able to maintain recurrent access to these resources over decades? To address this question, it is necessary to move from a system-level discussion of innovation financing to the organizational arrangements that mediate the mobilization and execution of public funding.

2.2 Intermediary organizations as core organizations for systematic funding

Intermediary organizations occupy a central place in the innovation literature because they connect actors, funders, and beneficiaries, facilitate knowledge exchange, reduce transaction costs, and support the coordination and implementation of complex projects across organizational boundaries. In doing so, they help stabilize innovation systems by sustaining implementation despite political shifts, institutional bottlenecks, and policy discontinuities (Dagnino & Velho, 1998; Howells, 2006; Kuhlmann & Rip, 2018; Rapini et al., 2015). At the same time, intermediation should not be understood as a single organizational model. Recent literature identifies multiple intermediary types—such as university incubators, innovation system intermediaries, open innovation intermediaries, transition intermediaries, KIBS, and cluster intermediaries—as well as organizational forms such as science parks, technology parks, advisory-service providers, and innovation centres (Caloffi et al., 2023). Yet these typologies do not fully capture nationally specific arrangements through which intermediation is organized in practice.

This limitation is particularly relevant in Brazil, where university support foundations represent a distinctive legal-organizational arrangement within the public science, technology, and innovation system. Although they do not appear as a standard intermediary type in the international literature, they play an important role in the management and execution of publicly funded research and innovation projects. Their absence from consolidated typologies points to an empirical and analytical gap, especially for understanding how nationally embedded legal-organizational arrangements sustain continuity in innovation funding and policy implementation over time. This relevance is also reflected in the existence of *Conselho Nacional das Fundações de Apoio às Instituições de Ensino Superior e de Pesquisa Científica e Tecnológica* (CONFIES), which represents more than 50 support foundations and reported more than 31.3 thousand projects and approximately R$ 20 billion under management in 2025 (CONFIES, 2025).

Support foundations are legally autonomous organizations affiliated with public universities and authorized to manage teaching, research, extension, and scientific and technological development projects funded by public or private sources. In practice, they act as intermediary arrangements between funding agencies and public universities, provide administrative and legal-execution capacities such as grant and contract management,

procurement procedures distinct from those of direct public administration, financial execution, reporting, and legal compliance. These capacities help explain their relevance in implementing complex research and innovation projects funded by FINEP and other public agencies (Negri et al., 2013). Their institutionalization is grounded in Federal Law No. 8.958/1994 (Lei n. 8.958, 1994) and later refined by Decree No. 7.423/2010 (Decreto n. 7.423, 2010), which clarified governance, accountability, and oversight requirements. They should therefore be understood not as independent policy actors, but as legally enabled organizational arrangements created to support the execution and management of university-led projects (Arocena & Sutz, 2010; Conceição & Santos, 2025; Negri et al., 2013).

Over time, these foundations may accumulate experience, relational capital, and legitimacy with public funding agencies, becoming recurrent conduits for the implementation of publicly funded STI projects (Howells, 2006; Kuhlmann & Rip, 2018). Their hybrid legal status may also provide a degree of insulation from political turnover and administrative disruption, they can be interpreted as arrangements that buffer implementation from systemic shocks (Mahoney & Thelen, 2010).

Within this broader discussion, public universities should not be seen merely as recipients of innovation funding. Together with their affiliated support foundations, they form a core organizational configuration for sustained resource mobilization. Universities contribute epistemic legitimacy, convening capacity across academia, government, and industry, and durable organizational memory that supports long-term engagement with policy instruments and funding programs (Etzkowitz & Leydesdorff, 2000).

Taken together, universities provide legitimacy, strategic orientation, and institutional anchoring, while support foundations provide the administrative and legal-execution capacities necessary to absorb and implement external resources. This configuration is especially important in contexts marked by institutional fragilities, where hybrid governance arrangements help sustain innovation policy implementation over time (Cimoli et al., 2020; Rapini et al., 2015). However, although the literature helps explain why universities and support foundations matter in innovation governance, it still lacks an analytical concept capable of capturing their sustained and repeated mobilization of public innovation resources across changing contexts. It is precisely this gap that the concept of Systematic Resource Mobilization for Innovation (SRM-I) is intended to address.

2.3 Systematic Resource Mobilization for Innovation (SRM-I)

The capacity to systematically mobilize resources for innovation is shaped, although not fully determined, by the broader innovation policy regime. Political ideologies, fiscal frameworks, regulatory institutions, and governance models condition the opportunities and constraints faced by organizations seeking access to public innovation resources (Edquist, 2011; Mazzucato, 2013). In volatile contexts such as Brazil's—marked by fiscal instability, legal complexity, administrative centralization, and organizational fragmentation—even well-designed STI policies may fail to achieve their intended effects in the absence of organizational infrastructures capable of sustaining implementation over time (Cassiolato & Lastres, 2008; Negri et al., 2013).

Econometric studies of public support for R&D and innovation have mainly focused on additionality effects, crowding-in or crowding-out dynamics, and firm-level performance outcomes such as employment, sales, and innovation effort (David et al., 2000; Grilli & Murtinu, 2011; Vanino et al., 2019). These contributions are important, but they do not provide a concept for examining which organizational arrangements are able to sustain repeated access to and execution of public innovation funding over time. Research on organizational learning and routines helps explain how repeated practices become stabilized (Levitt & March, 1988; Pentland & Feldman, 2005), while studies of persistence and path dependence emphasize continuity in unstable environments (Pierson, 2000; Roper & Hewitt-Dundas, 2008; Suárez, 2014). Likewise, the literature on R&D financing shows that the continuity and magnitude of public support matter analytically (Hall & Lerner, 2010; Vanino et al., 2019; Rosário et al., 2024). Yet none of these approaches offers a concept specifically oriented to the sustained and organized capacity of particular organizational arrangements to access, absorb, and execute public innovation resources across changing political, fiscal, and regulatory conditions.

In this study, SRM-I is operationalized through three analytical dimensions: recurrence of funding access, temporal continuity, and scale of mobilization. These dimensions are theoretically relevant because they capture distinct attributes of a systematic relationship with public innovation funding. Recurrence reflects organizational routinization,

since repeated access to funding opportunities suggests the development of stable practices for identifying, applying for, and managing public resources (Levitt & March, 1988; Pentland & Feldman, 2005). Temporal continuity captures persistence and resilience, because systematic mobilization must endure across time and under changing political, fiscal, and regulatory conditions rather than appear only in isolated episodes (Pierson, 2000; Roper & Hewitt-Dundas, 2008; Rosário et al., 2024; Suárez, 2014). Scale of mobilization reflects the ability to absorb, execute, and manage substantial resource flows over time, which is also central to the broader literature on the financing of R&D and innovation (Hall & Lerner, 2010; Vanino et al., 2019). Taken together, these dimensions make it possible to distinguish durable and organized funding mobilization from sporadic or opportunity-driven access to public resources.

Empirically, these dimensions are measured through project frequency, number of active funding years, and cumulative inflation-adjusted funding volume, which together form a composite SRM-I Index. Although this operationalization is tailored to the FINEP dataset, the concept is not limited to this case and may be applied to other public funding systems depending on data availability and institutional context. In this article, the index is used to examine whether SRM-I persists under adverse political and fiscal conditions, including periods of austerity and ideological reorientation. It also responds to a recurrent measurement problem in public open data: conventional indicators such as total funding volume or annual project counts capture scale at a single moment, but fail to reflect continuity, regularity, and resilience.

3. METHODOLOGY

3.1 Research design

This study adopts a longitudinal exploratory-descriptive research design based on the empirical analysis of administrative open data. The unit of analysis is the individual funded project. The study examines variation in public innovation funding across organizational types, understood here as distinct execution modalities. In particular, projects classified under university support foundations correspond to university-originated initiatives executed

through affiliated intermediary foundations, whereas projects classified under universities refer to direct university execution. This distinction allows the analysis to compare alternative organizational arrangements through which institutions access and manage public innovation funding. For analytical consistency, the term foundations refer exclusively to university support foundations.

3.2 Data source and construction

The empirical basis of this study is a longitudinal administrative dataset compiled from project records made available through FINEP's open-access portal (FINEP, 2025). The dataset covers publicly disclosed projects funded between 2002 and 2023 which includes 30,157 project-level observations. The unit of analysis is the individual funded project. Each record corresponds to a single project and contains information such as the proponent organization, legal classification, project title, date of funding concession, approved funding amount, and project category. Additional analytical variables were constructed by the research team based on the raw records, including organizational type, type of innovation, and classification by presidential administration. These derived variables were created to enable longitudinal comparison across recipient organizations and political periods. The resulting database was designed to support the analysis of long-term patterns in the allocation and execution of public innovation funding within the FINEP system.

3.3 Data cleaning and variable construction

The raw dataset underwent a structured process of cleaning, standardization, and derived-variable construction prior to analysis. First, project records were reviewed to verify the consistency of key identifying and temporal fields, including organization names, legal classifications, and contract dates. Organizational types and legal categories were harmonized to reduce inconsistencies in spelling, formatting, and classification across records. Second, a set of derived variables was created for analytical use. **Time-period classification** assigned each project to a presidential administration according to the date of funding concession. **Adjusted financial data** converted all monetary values to constant 2023

BRL using monthly IPCA rates obtained from the Brazilian Central Bank, **Organizational classification** grouped recipient organizations into analytically comparable categories: private companies (S/A and LTDA), university support foundations universities executing projects directly, public-sector agencies, and other organizations. Third, because funding values are highly concentrated in the FINEP dataset, extreme observations were not automatically treated as errors or excluded from the analysis. Instead, they were retained when consistent with the empirical structure of the funding system and interpreted as substantively meaningful observations rather than as statistical noise. This choice is particularly important in a study concerned with concentration, scale, and long-term patterns of resource mobilization. All cleaning and transformation procedures were conducted in a Python programming environment using the libraries *pandas*, *numpy*, *scipy.stats*, and *statsmodels*, ensuring reproducibility and traceability in the preparation of the analytical dataset.

3.4 Analytical procedures

The empirical analysis proceeded in four main stages:

Stage 1: descriptive statistics and aggregation

We computed the total volume of funding allocated to each **organizational type**, disaggregated by: (a) government period (FHC, Lula I & II, Dilma I & II, Temer, Bolsonaro, Lula III); and (b) project category (classified as Product Development, Infrastructure, Innovation Centers, etc.). This stage allowed us to identify the overall structure of resource allocation and detect extreme observations or abrupt shifts in funding distribution across periods.

Stage 2: exploratory temporal and organizational pattern analysis

Using pivot tables and time-series aggregation, we analyzed trends in funding flows across organizational types and government periods. This enabled us to explore initial patterns of

continuity and variation among recipient organizations, focusing particularly on: (a) the evolution of funding for university-affiliated support foundations relative to other actors; (b) shifts in funding patterns before and after fiscal contraction periods (2015–2018); and (c) concentration of funding in particular legal categories (e.g., the dominance of S/A firms).

Stage 3: construction and application of the SRM Index

To operationalize Systematic Resource Mobilization for Innovation (SRM-I), we constructed a composite SRM-I Index at the organizational level. The index is based on three indicators: project frequency, measured as the total number of funded projects per organization; temporal continuity, measured as the number of distinct years in which the organization appeared in the funding dataset; and cumulative funding volume, measured as the total inflation-adjusted BRL received over the period analyzed. These three indicators were used to capture, respectively, recurrence, persistence, and scale in resource mobilization. After normalization and aggregation, the resulting SRM-I scores were used to rank organizations and compare broader organizational categories. Because the SRM-I was calculated at the organizational level, subsequent comparisons and statistical tests, including ANOVA, assess between-group differences in aggregated organizational scores rather than project-level variation.

4. RESULTS

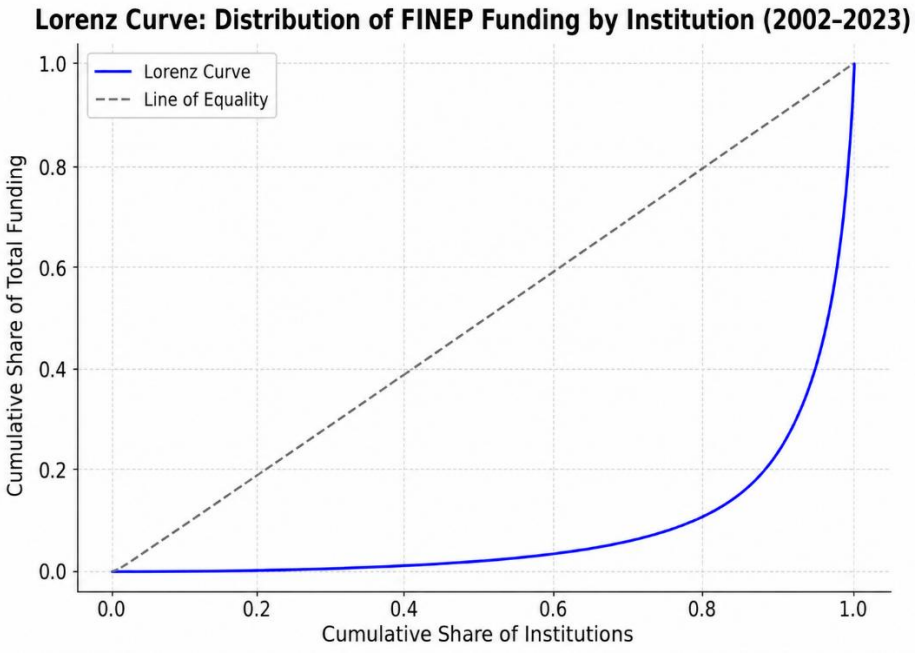
4.1 General distribution of innovation funding (2002-2023)

The dataset reveals that between 2002 and 2023, FINEP allocated approximately BRL 87 billion (adjusted) across 30,157 innovation-related projects. The distribution of these funds was markedly concentrated, with private firms receiving the highest share, particularly those classified as Sociedades Anônimas (S/A) and Limitadas (LTDA). Together, these two legal forms absorbed over 50% of the total funding, with the majority directed toward development-oriented projects, which include technology development, system integration, and process innovation. Lorenz analysis shows a significant inequality in Funding

distribution: a small share of institutions captured a large portion of total funding (Figure 1). Gini coefficient of 0.816 also indicates a very high level of inequality of the funding distribution, as reported in other studies about the inequality of funding distribution.

Figure 1

Lorenz curve of funding concentration



Source: Elaborated by the authors.

In contrast, **public-sector organizations**—such as municipalities, public agencies, and federal institutes—represented a small fraction of recipients. Funding for entrepreneurship-related entities such as SEBRAE remained marginal, amounting to less than **BRL 2 million** over the two-decade span. These findings confirm the firm-centered orientation of Brazil's STI policy, but also point to a narrow base of beneficiaries.

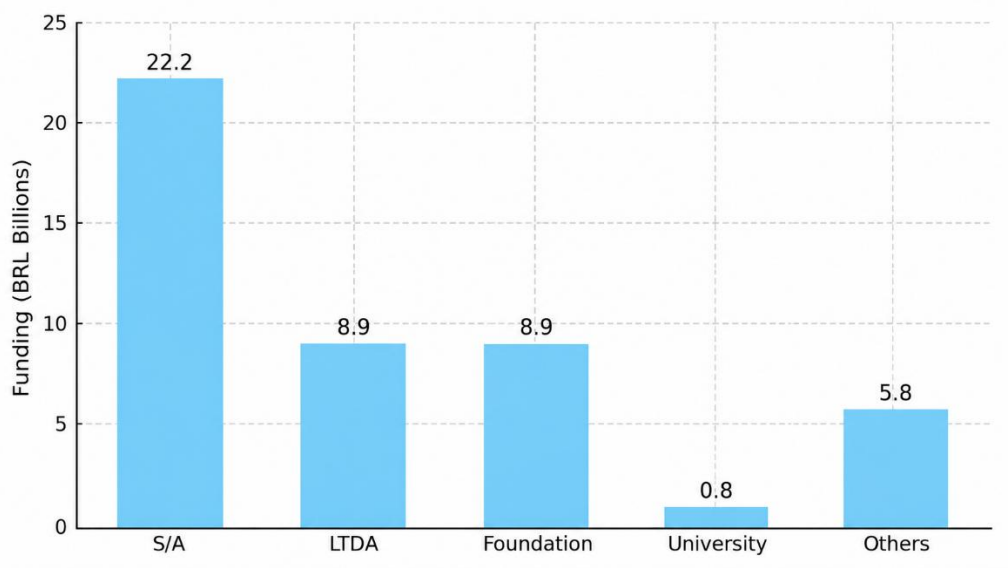
A key structural feature that emerges from this distributional analysis is the distinct and sustained presence of the university support foundations. Although they represent a smaller number of actors compared to private firms, they consistently appear as **top recipients in volume and frequency**.

A distinct and persistent feature in this distribution is the prominence of the university support foundations, which—despite representing a smaller pool of recipients—consistently

secured high volumes of resources over two decades. This suggests a potential organizational structure capable of sustained engagement with public innovation funding instruments (Figure 2). This analysis presents the aggregate distribution of funding across recipient categories in the FINEP dataset, considering all modalities of funding. This descriptive comparison should be interpreted in light of the institutional context, since different FINEP instruments involve distinct eligibility rules across recipient types; not all organizations are eligible in every call. Hence, the figure is intended to show the observed allocation patterns in the dataset rather than isolate the effect of organizational characteristics alone.

Figure 2

Total funding by organizational type (2002-2023)



Source: Elaborated by the authors.

4.2 Temporal trends and political regime analysis

The temporal patterns identified in the allocation of innovation funding are closely related to the evolution of the FNDCT, which constitutes the principal financial backbone of federal science, technology, and innovation (STI) policy in Brazil. Although the empirical analysis is conducted at the level of FINEP project execution, the observed expansion, contraction, and reorientation of funding across presidential administrations largely reflect changes in the

budgetary execution, earmarking rules, and political treatment of FNDCT resources. Analysis confirms that presidential administrations significantly influenced the intensity and orientation of funding. During Lula's two terms (2003–2010), the distribution of resources was relatively balanced, with notable increases in support for infrastructure and academic projects, including funding directed to universities and foundations (Figure 3). During Lula's administrations (2003–2010), the relative balance in funding distribution and the expansion of support for infrastructure and academic projects were enabled by a period of progressive consolidation and capitalization of the FNDCT, including the strengthening of sectoral funds and greater political commitment to public investment in STI. This environment expanded the pool of available resources and allowed FINEP to operate a diversified portfolio of instruments that benefited university support foundations.

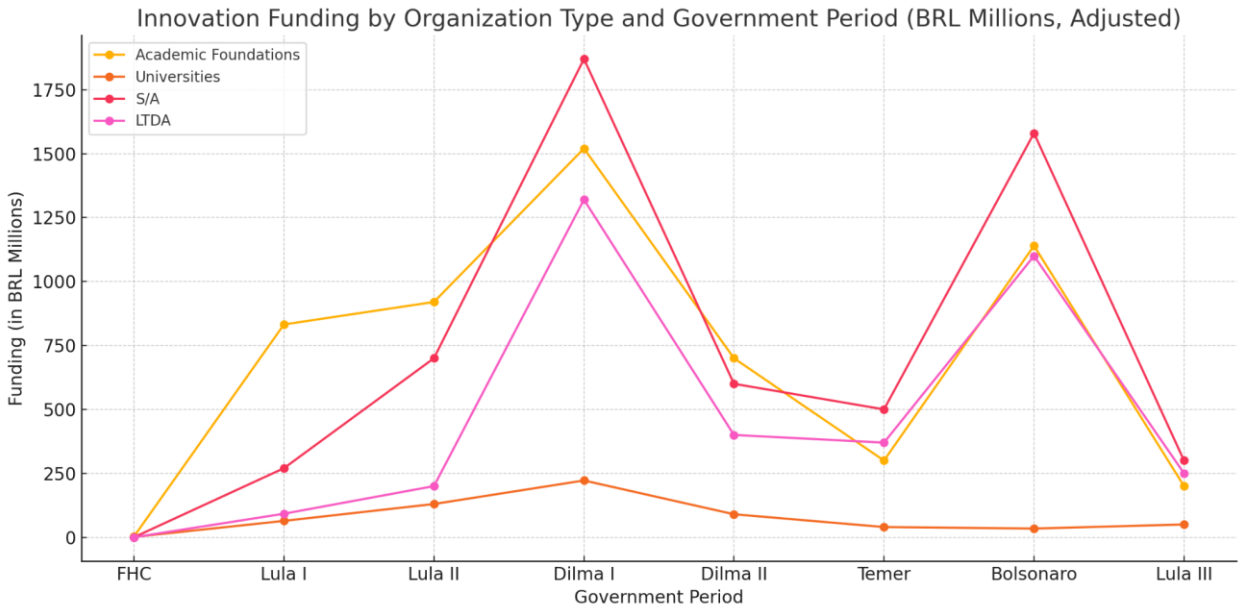
The Dilma I period (2011–2014) marked the historical peak of public investment in innovation. This phase saw record-level disbursements, particularly in the categories of Development and Innovation Centers, with university support foundations receiving over BRL 1.52 billion, the highest in the entire dataset. The Dilma I period coincides with the maximum effective execution of FNDCT resources. High levels of budget authorization and release from the Fund made possible the record disbursements observed in Development and Innovation Center projects. The performance of university support foundations during this period reflects their capacity to absorb and execute large volumes of FNDCT-backed funding when fiscal and political conditions were favorable. Following the economic and political crisis of 2015–2016, the Temer administration implemented fiscal austerity measures that resulted in a sharp contraction of innovation funding. The decline was particularly steep in support to public and academic institutions, suggesting vulnerability in the face of budget cuts. Fiscal austerity measures, including limits on discretionary spending and the reallocation of public resources, reduced the effective availability of FNDCT funds. This contraction disproportionately affected public and academic institutions, which are more dependent on non-reimbursable and infrastructure-oriented instruments financed by the Fund.

Under the Bolsonaro government (2019–2022), a shift toward market-led innovation became more explicit. Private companies (especially S/A) were once again the main recipients. university support foundations maintained a relatively strong position, securing

BRL 1.14 billion, which indicates a level of institutional resilience and adaptability in aligning with changing STI policy priorities. Under the Bolsonaro administration (2019–2022), the shift aligns with a reorientation in the use of FNDCT resources, favoring instruments and projects more closely aligned with private-sector participation. Despite continued constraints on the Fund's execution, university support foundations maintained relatively high funding levels, indicating an organizational capacity to adapt to changing funding priorities and to continue mobilizing FNDCT-backed resources through FINEP even under a less favorable policy environment.

Figure 3

FINEP funding for organizations by government period



Source: Elaborated by the authors.

Preliminary data for Lula III (2023–), while incomplete, suggest a modest recovery in funding flows to academic and public-sector actors, potentially signaling a return to the inclusive approach of previous Workers' Party administrations. This initial uptick is consistent with early signals of a renewed political commitment to the FNDCT as a central instrument of federal science, technology, and innovation (STI) policy, including efforts to restore the effective execution of previously constrained resources. Although it is too early

to draw firm conclusions, these patterns may indicate a gradual reorientation toward a more inclusive funding approach, resembling that observed during earlier Workers' Party administrations, in which universities and university support foundations played a more prominent role in the allocation of FNDCT-backed resources through FINEP.

4.3 Systematic Resource Mobilization (SRM-I Index)

To empirically assess the Systematic Resource Mobilization for Innovation (SRM-I) framework, we constructed a composite index—the SRM Index—for each proponent organization. Analysis revealed that the top-ranked institutions by SRM Index are university support foundations. Despite being fewer in number, these entities demonstrated disproportionately high performance on all three SRM dimensions. A one-way ANOVA was conducted to assess whether differences in SRM Index across institution types were statistically significant. Results confirmed a highly significant effect:

a) **F-statistic**: 164.81
b) **p-value**: 1.10×10^{-126}

This finding (Table 1 and Figure 4) confirms that organizational execution modality matters significantly for systematic resource mobilization. Projects executed through university support foundations are not only prominent, but statistically distinct from other organizational arrangements—including direct university execution, private firms, and public agencies—in their capacity to sustain long-term engagement with public innovation funding. This is related to the active years of funding, which is larger than other organizations.

Table 1

SRM Index by organization

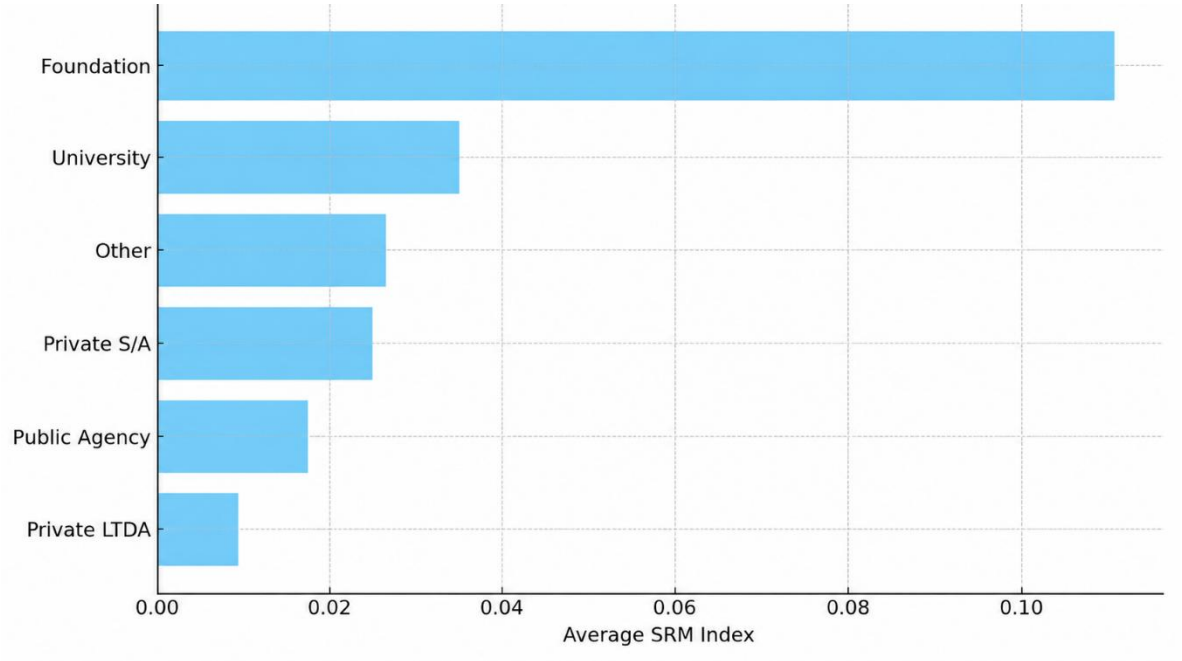
Organization Type	Avg. SRM-I Index	Unique Organizations	Avg. Active Years of Funding
Support Foundation	0.1107	330	7.84

University	0.035	110	6.15
Other	0.0265	874	4.62
Private S/A	0.0249	536	3.41
Public Agency	0.0175	32	4.53
Private LTDA	0.0094	997	2.63

Source: Elaborated by the authors.

Figure 4

Average SRM Index by organization



Source: Elaborated by the authors.

The statistically significant differences observed across institutional groups indicate that SRM behavior is not randomly distributed, but rather institutionally structured by execution modality and governance arrangement. Projects executed through university support foundations, in particular, display patterns of systematic and sustained engagement with public innovation funding that are not observed among other organizational arrangements, including direct university execution, private firms, and public agencies. These results reinforce the theoretical proposition of Systematic Resource Mobilization for

Innovation (SRM-I) as a distinct organizational capability, grounded in organizational design and routinized practices, rather than an episodic or opportunity-driven funding outcome.

To complement the group-level analysis, we estimate a regression model examining whether the average number of years an organization remains active within the FINEP funding system is associated with its SRM-I Index score. This variable captures organizational persistence and long-term embeddedness in public innovation funding mechanisms. The results provide empirical support for the theoretical expectation that organizational persistence contributes to capacity-building in innovation governance. Organizations with longer and more continuous engagement in the funding system—particularly projects executed through university support foundations—are more likely to accumulate the operational knowledge, administrative routines, and reputational capital required to consistently access and manage public innovation resources (Table 2).

Table 2

Results from linear regression model

Metric	Value
R-squared	0.900
Adjusted R^2	0.875
F-statistic	36.05
p-value (F-stat)	0.0039
Coefficient (Years)	0.0187
Intercept	-0.1424

Source: Elaborated by the authors.

The regression results reveal a statistically significant association between organizational persistence in the FINEP funding system and SRM performance (F-statistic $p = 0.0039$), accompanied by high explanatory power ($R^2 = 0.90$; adjusted $R^2 = 0.875$). This indicates that variation in SRM-I Index values across institutions is strongly associated with differences in the duration of their engagement with FINEP-funded innovation activities. The positive coefficient on years active (0.0187) suggests that longer and more sustained participation in the funding system is more correlated with higher SRM-I performance. The

high explanatory power of the model reflects both the aggregated organizational level of analysis and the presence of strong persistence effects inherent to long-term engagement with public innovation funding mechanisms. Rather than capturing short-term fluctuations, the regression isolates cumulative dynamics through which repeated participation reinforces organizational routines, administrative capabilities, and relational embeddedness within the funding system.

4.5 SRM-I Index by university support foundations

The analysis of the SRM Index reveals a pronounced concentration of systematic resource mobilization capacity among a relatively small group of university support foundations, underscoring their central role in the operational architecture of Brazil's innovation system. The highest-performing foundations—FUNPAR (PR), FUNPEC (RN), FUNARBE (MG), FAURGS (RS), FIOTEC (RJ), CECIERJ Foundation (RJ), FUNDEP (MG), FUSP (SP), COPPETEC (RJ), and GITGE (SP)—exhibit consistently elevated SRM-I scores, reflecting high levels of organizational resilience and adaptive capacity. Over the two-decade observation period, these organizations maintained continuous engagement with FINEP funding instruments and performed strongly across all three SRM-I dimensions: project frequency, temporal continuity, and cumulative funding volume (Table 3). From a spatial perspective, the leading foundations are predominantly affiliated with major federal universities and public research institutions located in states with more developed innovation ecosystems, notably São Paulo, Rio de Janeiro, Minas Gerais, and Rio Grande do Sul. This geographic concentration suggests a close association between regional innovation capacity and organizational resource mobilization performance, as these states also rank highly in national indicators of scientific production, patenting activity, and industry–university collaboration. At the same time, the strong performance of FUNPEC (RN) stands out as a notable exception within the Northeast region, indicating that strategic institutional development and intermediary capacity building can enable systematic resource mobilization even outside Brazil's traditional innovation hubs.

Table 3

SRM-I Index by university support foundations

Foundation	State	SRM-I Index	Total Projects	Total Funding (BRL)	Active Years
Fundação Coordenação de Projetos, Pesquisas e Estudos Tecnológicos (COPPETEC)	RJ	0.6510	191	R$ 1.295.730.328,00	19
Fundação de Desenvolvimento da Pesquisa (FUNDEP / UFMG)	MG	0.5808	151	R$ 1.253.100.247,00	19
FAURGS (*Fundação da* UFRGS)	RS	0.5748	158	R$ 721.836.507,00	18
FUSP (*Fundação da* USP)	SP	0.5660	143	R$ 723.696.252,00	19
Fundação de Apoio ao Desenvolvimento da UFPE (FADE)	PE	0.5259	140	R$ 928.167.479,00	17
Fundação de Amparo e Desenvolvimento da Pesquisa (FADESP / UFPA)	PA	0.5253	110	R$ 518.261.562,00	20
Fundação Universitária José Bonifácio (FUJB / UFRJ)	RJ	0.5220	128	R$ 657.544.257,00	18
FUNCAMP (*Fundação de Desenvolvimento da Unicamp*)	SP	0.5094	121	R$ 412.830.653,00	18
FUNPEC (*Fundação Norte-Rio-Grandense de Pesquisa e Cultura* / UFRN)	RN	0.4851	107	R$ 569.405.303,00	18
FEESC (*Fundação de Ensino e Engenharia de Santa Catarina* / UFSC)	SC	0.4760	122	R$ 345.044.747,00	16

Source: Elaborated by the authors.

These results provide new evidence of the importance of the university–foundation nexus in sustaining long-term mobilization of public innovation funding in Brazil, as observed in the FINEP dataset. The consistently high performance of the top-ranked foundations may reflect not only organizational maturity, but also the critical role of legal–operational infrastructure, routinized execution capabilities, and accumulated relational capital in preserving access to public innovation funding under conditions of political and fiscal volatility. Taken together, these findings provide empirical support for the SRM-I framework by suggesting that systematic resource mobilization is closely linked to organizational continuity and embeddedness, rather than episodic funding success. Organizations that remain consistently active over extended periods—most notably projects

executed through university support foundations—exhibit higher levels of SRM performance, reinforcing the interpretation of SRM-I as a cumulative and path-dependent institutional capability grounded in governance design and long-term engagement.

As a robustness check, a sensitivity analysis of the SRM-I Index was conducted by recalculating the baseline index under alternative perturbation scenarios. Following established guidance in the composite indicators literature, the aim was to assess whether modest changes in index specification would materially alter organizational scores and rankings (Nardo et al., 2008). The OECD/JRC Handbook on Constructing Composite Indicators identifies robustness and sensitivity analysis as a core step in composite indicator construction, particularly for evaluating how methodological choices related to normalization, weighting, aggregation, and indicator specification may affect resulting scores and ranks. Starting from the baseline specification, the three constituent dimensions of the SRM-I Index—project frequency, temporal continuity, and cumulative funding volume—were perturbed under ±10% alternative scenarios prior to min–max normalization. The resulting normalized scores and rankings were then compared with those of the baseline index in order to assess the stability of institutional positions under modest variation in index specification. The ±10% threshold was adopted as a heuristic parameter for examining normal variation in the construction of the measure; a more demanding ±25% scenario was also tested and produced broadly similar ranking patterns among the top-performing institutions. The results indicate a high degree of ranking stability and limited score variation in the SRM-I Index. At the categorical level, support foundations combined the highest average SRM-I score (0.1107) with low ranking sensitivity, exhibiting an average maximum rank change of 1.59 positions, compared with 1.88 for universities, 1.70 for other organizations, 2.10 for public agencies, and 3.62 for private S/A firms. At the organizational level, leading support foundations such as COPPETEC, FUNDEP, FAURGS, and FUSP showed no ranking change under the ±10% perturbation scenarios, while their maximum SRM-I score variation remained limited, at approximately 0.032–0.033. More broadly, the top 10 support foundations all recorded zero rank variation, with score changes ranging from 0.029 to 0.033. These results suggest that the ranking positions of these organizations in the SRM-I Index are not highly sensitive to modest perturbations in its constituent components and instead reflect a relatively balanced combination of recurrence, continuity, and

cumulative scale. By contrast, the greater volatility observed among private S/A firms is consistent with less stable ranking positions under the same perturbation scenarios. Taken together, these findings support the robustness of the SRM-I Index as an empirical measure of sustained patterns of resource mobilization within the FINEP dataset, while not in themselves establishing causal organizational mechanisms.

4.6 Sectoral and thematic distribution: short-term and long-term innovation

An analysis of the types of innovation funded by FINEP in the two decades reveals a clear differentiation across organizational arrangements. The most frequently supported project categories include product development, systems development, and infrastructure, typically associated with industrial applications, information and communication technologies (ICT), and large-scale research equipment. Projects executed through university support foundations captured a substantial share of resources in innovation centers and research infrastructure, reinforcing their role not only in supporting scientific activity, but also in sustaining the physical, organizational, and managerial backbone of the national innovation system. By contrast, universities executing projects directly were markedly less present in high-capital and multi-year project categories, particularly after 2015. This pattern reflects persistent constraints in the direct management of complex procurement processes, long-term financial execution, and large-scale contractual arrangements. Public-sector agencies, in turn, were predominantly associated with smaller-scale initiatives, such as event-based activities, training programs, and capacity-building interventions, which typically involve lower financial complexity and shorter execution horizons. We tested whether there is a statistically significant relationship between organization type (especially S/A and LTDA vs. Foundations) and the type of innovation project funded by FINEP (Table 4).

Table 4

Test results

Test Statistic	Value
Chi-square (χ^2)	12,158.67

Degrees of Freedom	64
p-value	< 0.0001

Source: Elaborated by the authors.

The **highly significant p-value** indicates that the **distribution of project types is not independent** from the **type of organization**. In other words, different organizational categories systematically prioritize different types of innovation projects. In particular:

a) Private firms (S/A and LTDA) are **overrepresented** in **Product Development** projects. This reflects their focus on market-driven innovation, often aligned with short- and medium-term commercial objectives.

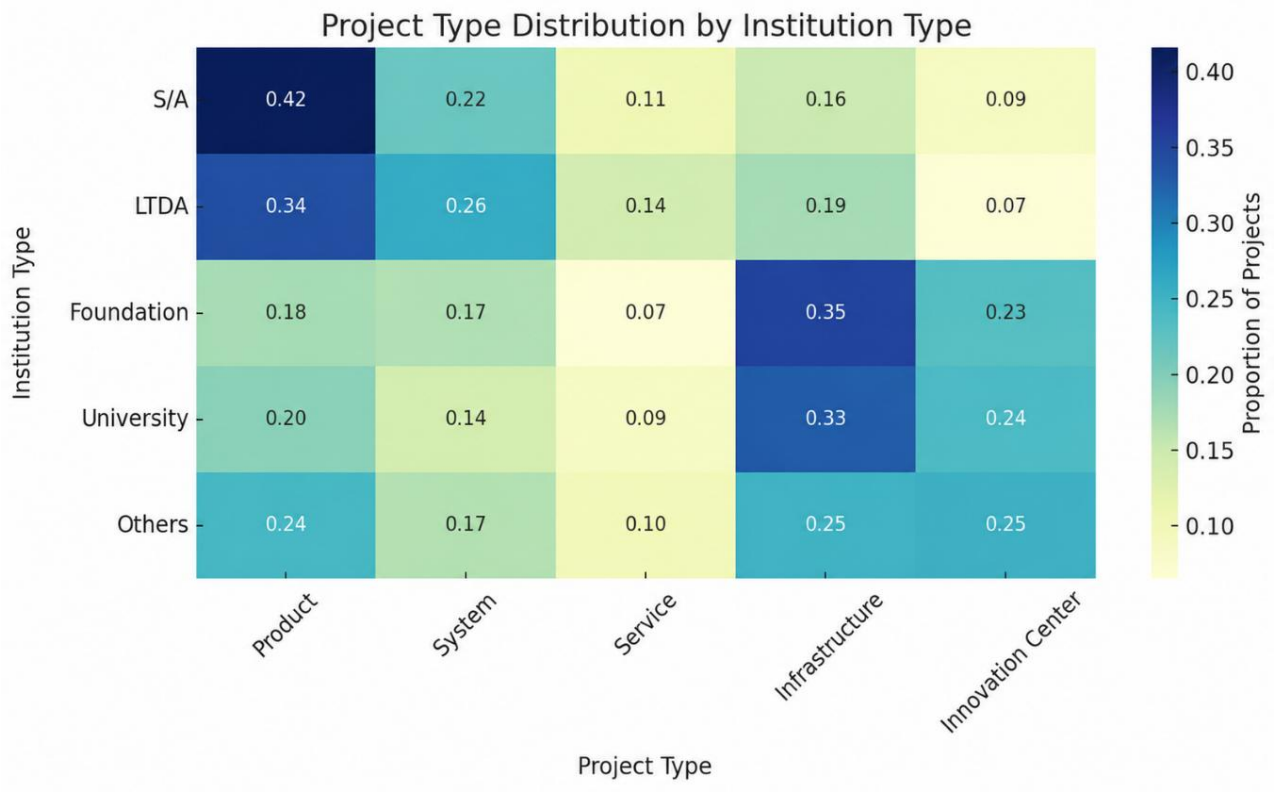
b) University support foundations are more associated with Infrastructure and Innovation Center projects. These project types typically involve **long-term, capital-intensive investments** in research facilities, laboratory networks, shared equipment platforms, and collaborative innovation environments.

This statistical evidence supports the hypothesis that **private firms predominantly engage in near-market innovation activities**, whereas **projects executed through** university support foundations **play a critical role in building structural and long-term innovation capacities**. This is consistent with previous studies (Puffal et al., 2021). These roles are complementary rather than substitutive, underscoring the importance of a **balanced innovation policy mix** that simultaneously supports applied, market-oriented innovation and sustained investment in the institutional and infrastructural foundations of long-term innovative capacity.

The complementary heatmap highlights that while SA/LTDA captured more FINEP funding for product and system innovation, foundations and universities received more funding for infrastructure and innovation centers (Figure 5).

Figure 5

Heatmap - Type of Innovation x Type of Organization



Source: Elaborated by the authors.

While this study focuses on resource flows rather than innovation outcomes, the concentration of funding in infrastructure and innovation centers suggests an orientation toward structural, long-term capacity-building in **university-affiliated support foundations**. These types of investments are commonly associated with positive externalities in university–industry collaboration and regional development (Mowery & Sampat, 2005).

5. CONCLUSION

This study examined how different types of organizations in Brazil mobilized FINEP public innovation funding between 2002 and 2023 across multiple political administrations and fiscal cycles. The central finding is that projects executed through university support foundations displayed stronger patterns of project frequency, temporal continuity, and

cumulative funding than other organizational arrangements, even as the aggregate public investment in science, technology, and innovation substantially fluctuated over time. Although private firms—particularly corporations (S/A) and limited partnerships (LTDA)—absorbed the largest share of total funding volume, the longitudinal evidence shows that projects executed through university support foundations consistently maintained—and in several cases expanded—their access to federal innovation funding across four successive presidential administrations. These findings should be interpreted within a funding architecture in which the FNDCT provides the principal financial backbone of federal innovation policy. On average, university support foundations remained active in the FINEP funding system for 7.84 years—substantially longer than private organizations and universities without support foundations—while the top 10 foundations averaged 18.2 years of active funding.

Theoretically, the study advances understanding of how long-term participation in public innovation funding systems is shaped not only by the availability of policy instruments, but also by the organizational arrangements through which those instruments are accessed and executed. In the Brazilian case of FINEP, the evidence suggests that the university–foundation nexus is not merely an administrative detail, but a central mechanism through which public innovation resources are mobilized over time. This pattern is consistent with an organizational reconfiguration in which public universities increasingly rely on affiliated support foundations to execute complex research and innovation projects under changing political, fiscal, and administrative conditions. A second relevant finding is that projects executed through university support foundations are more strongly associated with Infrastructure and Innovation Center project categories. Since these categories typically involve long-term and capital-intensive investments in research facilities, laboratory networks, shared equipment platforms, and collaborative innovation environments, their concentration among foundation-executed projects suggests that these intermediary structures play an important role in sustaining the administrative, organizational, and governance conditions that support the national innovation system.

The findings contribute to three connected debates. First, **with respect to the financing of National Innovation Systems**, the literature suggests that innovation systems are shaped not only by interactions among firms, universities, and governments, but also by

hybrid governance structures that emerge within public institutions themselves (Albuquerque et al., 2015; Cassiolato & Lastres, 2008; Lundvall, 2010; Nelson, 1993). In this sense, university support foundations deserve greater theoretical attention because they enable public universities to access FINEP funding for the construction of critical innovation infrastructure. Second, in relation to **policy implementation and state capacity**, the results indicate that the effectiveness of public innovation policy depends not only on funding availability or formal institutional design, but also on the organizational arrangements capable of sustaining continuity of execution over time. Third, in relation to the literature on **governance intermediaries**, the study provides longitudinal evidence that university support foundations may function as stabilizing intermediary arrangements linking academic priorities to the administrative and legal requirements of public funding systems (Howells, 2006; Kuhlmann & Rip, 2018), accumulating experience, serving as institutional buffers, and helping universities execute projects within complex innovation funding schemes. The findings are also consistent with path-dependent and cumulative interpretations of long-term engagement with public innovation funding. Organizations that remain active over longer periods appear more likely to sustain recurring access to funding instruments, suggesting the importance of accumulated organizational routines, legal-operational capacities, and embeddedness within the funding system (Pierson, 2000). In this sense, Systematic Resource Mobilization for Innovation (SRM-I) can be useful as a conceptual lens for examining how specific organizational arrangements repeatedly access, absorb, and execute public innovation resources across changing political and fiscal contexts.

At the same time, these findings should be interpreted with limitations. The study identifies structured longitudinal patterns and statistically significant differences across organizational arrangements, but it does not establish causal effects between organizational form and funding outcomes.

5.1 Public policy recommendations

The results of this study carry important policy implications for Brazil and other middle-income countries seeking to enhance the institutional effectiveness of their NIS. In particular, the demonstrated success of university–foundation complexes in consistently mobilizing

public innovation funding suggests that innovation policy should go beyond project-level support and focus on strengthening the institutional capacities and governance architectures that enable long-term, cross-regime continuity. Based on Borrás and Edquist (2013), we propose the following recommendations for innovation policy: the findings underscore that innovation system resilience depends not only on policy intent or project-level novelty, but on governance designs that explicitly prioritize (1) institutional capacity-building as a strategic asset of the innovation system. This requires dedicated institutional funding lines aimed at organizational development—supporting professionalization, digital infrastructure, compliance systems, and long-term learning—rather than limiting public support to project execution alone. It also implies formally integrating university support foundations and representative entities such as CONFIES into national and subnational STI planning, coordination, and monitoring arenas, recognizing their de facto role in policy implementation and reducing persistent coordination failures. Complementing this, systematic benchmarking, peer-learning, and exchange mechanisms among foundations are essential to diffuse best practices and mitigate the uneven, path-dependent development observed across institutions (Arocena & Sutz, 2010).

5.2 Limitations and directions for future research

This study has limitations. First, it examines funding flows and patterns of resource mobilization within the FINEP system, rather than innovation outputs or broader socio-economic impacts. It therefore does not show whether organizations with higher SRM-I scores also perform better in terms of patents, publications, technology transfer, spillovers, or regional development. The results should thus be interpreted as evidence of sustained engagement with public innovation funding, not as a direct measure of innovation performance. Second, the analysis is constrained by the scope of FINEP's administrative data. While the dataset captures funding frequency, continuity, cumulative volume, organizational type, and project characteristics, it does not reveal the internal processes through which systematic resource mobilization is built and maintained, such as administrative routines, legal strategies, organizational learning, or reputational dynamics. Third, the SRM Index is only one empirical operationalization of Systematic Resource

Mobilization for Innovation (SRM-I). Although it incorporates recurrence, continuity, and scale, it does not capture all possible dimensions of the concept. Fourth, the analytical strategy is descriptive and relational rather than causal. The study identifies meaningful differences and associations across organizational arrangements, but it does not establish causal effects. Explanations involving organizational learning, adaptation, or buffering capacity should therefore be understood as theoretically informed interpretations rather than tested causal claims.

Future research could extend this analysis in several directions. First, future studies could link SRM-I scores to innovation outputs and broader socio-economic outcomes, such as patents, scientific publications, technology transfer agreements, university–industry collaboration, firm performance, regional development, and spillover effects. This would make it possible to assess whether sustained resource mobilization is also associated with stronger innovation performance, understanding predictors, moderators and outcomes. Second, qualitative and comparative case studies could examine the internal organizational mechanisms through which SRM-I is developed and maintained, including networks and associations, administrative routines, legal-execution capabilities, compliance practices, organizational learning, and relational capital with funding agencies. Third, future research could refine the SRM Index by incorporating additional dimensions, such as project complexity, execution performance, network centrality, diversification of funding sources, or the ability to mobilize resources across different public agencies. Fourth, causal research designs could be used to test whether specific organizational arrangements, policy changes, or funding instruments produce higher levels of systematic resource mobilization. Comparative studies across other Brazilian funding agencies, subnational innovation systems, or other middle-income countries could assess whether SRM-I is a context-specific feature of the FINEP system or a broader pattern in public innovation funding. Finally, the study findings extend earlier debates on the relationship between public investment, implementation capacity, and the role of Brazilian federal universities in responding to complex societal challenges. Whereas Panizzon, Costa, and Medeiros (2020) examined how public universities mobilized resources and capabilities to respond to the COVID-19 crisis and problematized the role of public funding, this study shows that similar implementation capacities are also relevant to the long-term mobilization of public innovation funding toward

research infrastructure, innovation centers, laboratory networks, shared equipment platforms, and the creation of new organizational and technological capabilities. In this sense, SRM-I provides a foundation for a broader framework to understand how public universities and their support foundations sustain the organizational conditions required to address complex societal and technological challenges. This opens a future research agenda on whether and how the organizational conditions accumulated through long-term resource mobilization may strengthen institutional learning and crisis-response capacity, and contribute to National and Regional Anticipatory Governance Systems.

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CONFLICT OF INTEREST STATEMENT

Mateus Panizzon: Conceptualization (Equal); Data curation (Lead); Formal analysis (Equal); Investigation (Equal); Methodology (Lead); Project administration (Lead); Resources (Lead); Software (Lead); Supervision (Lead); Validation (Equal); Visualization (Equal); Writing – original draft (Equal); Writing – review & editing (Equal).
Camila Furlan da Costa: Conceptualization (Equal); Formal analysis (Equal); Investigation (Equal); Validation (Equal); Visualization (Equal); Writing – original draft (Equal); Writing – review & editing (Equal).

CONFLICT OF INTEREST STATEMENT

The authors have no conflict of interest.

RESEARCH DATA AVAILABILITY STATEMENT

The dataset supporting this study is available at http://www.finep.gov.br/transparencia-finep/paineis-e-downloads/central-de-downloads

AI USAGE STATEMENT

OpenAI's ChatGPT (GPT-5) was used to assist with the technical and grammatical review of the text and the standardization of references. The authors reviewed and approved the final work, assuming full responsibility for its content.

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