E-ISSN: 3108-4176

APSSHS

Academic Publications of Social Sciences and Humanities Studies
2025, Volume 6, Issue 2, Page No: 128-139
Available online at: https://apsshs.com/

Annals of Organizational Culture, Leadership and External Engagement Journal

From Passive to Proactive: Strategic Approaches to Technology Offering in University Technology Transfer Offices

Claire Dupont[1]*, Julien Martin[1]

1. Department of Organizational Communication and Leadership, Faculty of Economics and Management, University of Bordeaux, Bordeaux, France.

Abstract

The objective of this study was to examine the strategies and challenges associated with technology transfer (TT) within technology transfer offices (TTOs), with a particular focus on initiatives aimed at promoting technologies included in their portfolios. This qualitative study adopted a multiple case study design based on semi-structured interviews with TTO managers from seven Brazilian public Science and Technology Institutions (STIs): University of São Paulo (USP), State University of Campinas (UNICAMP), Paulista State University (UNESP), Federal University of Minas Gerais (UFMG), Federal University of Paraná (UFPR), Federal Technological University of Paraná (UTFPR), and Oswaldo Cruz Foundation (FIOCRUZ). Institutions that dedicate greater resources to actively promoting and marketing their technology portfolios tend to achieve stronger performance in TT than those that rely on passive approaches. Although proactive strategies have become increasingly relevant, considerable heterogeneity remains among Brazilian TTOs, with some still engaging in limited or passive commercialization of intellectual property. The findings also underscore the importance of establishing clear regulatory frameworks to reduce legal uncertainty for researchers pursuing entrepreneurial activities based on STI-owned intellectual property. Research on innovation and marketing dimensions of technology transfer between academic institutions and firms in developing contexts remains underdeveloped. This study therefore contributes to advancing knowledge in this area and to improving TTO practices. The conclusions of this study are not generalizable, as they are confined to the institutions investigated. Nevertheless, the results provide relevant insights for STI administrators, policymakers, and TT scholars.

Keywords: Technology transfer, Technology transfer office, Technology offering, Technology marketing, Spin-off

How to cite this article: Dupont C, Martin J. From Passive to Proactive: Strategic Approaches to Technology Offering in University Technology Transfer Offices. Ann Organ Cult Leadersh Extern Engagem J. 2025;6(2):128-39. https://doi.org/10.51847/hF8l3RRQla

Received: 29 June 2025; **Revised:** 19 November 2025; **Accepted:** 23 November 2025
Corresponding author: Claire Dupont
E-mail ✉ claire.dupont@gmail.com

Introduction

The field of technology transfer (TT) has expanded significantly in recent years, reflecting growing attention from researchers, institutional managers, and entrepreneurs [1]. This evolution has heightened expectations that universities and research organizations will effectively channel knowledge generated in laboratories to industry and society through licensing agreements and collaborative partnerships. However, the majority of TT studies involving public institutions and firms have focused on developed economies, leaving a limited understanding of emerging contexts such as Brazil [2].

Within Brazilian Science and Technology Institutions (STIs), responsibility for developing TT strategies lies primarily with technology transfer offices (TTOs). These units are established by law to oversee intellectual property management and innovation policies, facilitate institutional engagement with companies, and support the commercialization of research outputs [3].

However, evidence from the Ministry of Science, Technology, Innovations, and Communications (2019) indicates that the development of TT-related strategies and studies is among the least implemented activities in Brazilian TTOs. Among 305 TTOs analyzed, only 25.2% reported that TT strategy development had been fully implemented. Thus, despite the Brazilian Innovation Law [4], which promotes STI–industry interaction, TT remains a persistent challenge. Moreover, many TTOs continue to prioritize intellectual property protection over active transfer activities, which results in a low number of formal TT agreements across STIs. These observations highlight the need for research that supports the structuring and strengthening of TT processes.

A study conducted in the United States by [5] identified that limited marketing capability, technical expertise, and negotiation skills represent key barriers to TT. In Brazil, identifying and engaging industrial partners remains a major challenge [6, 7]. This challenge is compounded by the relatively underdeveloped practices for promoting academic technologies for commercialization [7]. Consequently, improving the ways technologies are marketed and presented to firms may represent a critical mechanism for fostering innovation within STIs [7-9]. Nevertheless, research on the interface between technological innovation in universities and marketing strategies across the full research-to-commercialization pathway remains scarce [7, 9, 10].

In this context, the present study aims to address the knowledge gap on TT in developing countries. The guiding research question is: How do Brazilian TTOs offer technologies? Accordingly, the study investigates how Brazilian TTOs promote technologies within their portfolios and identifies the strategies and challenges involved in TT processes. To achieve this, seven Brazilian institutions and their respective TTOs were examined. Based on their reported experiences, the study offers insights that may help overcome barriers to innovation.

This research contributes to the still-limited literature on marketing and innovation in technology transfer between academic institutions and firms in developing countries, as highlighted by previous studies [7, 9, 10]. From a practical standpoint, the findings may assist managers in improving and implementing technology offering strategies within TTOs. Furthermore, the knowledge generated can support the design of more effective public policies and management strategies to strengthen long-term STI–industry collaboration in Brazil.

Technology transfer and technology offer

The concept of "technology transfer" refers broadly to the movement and sharing of technological knowledge across organizational boundaries. However, its meaning varies depending on disciplinary focus and research objectives [11, 12] classify university–industry technology transfer into three main categories:

1. Non-commercial transfer, which includes academic publications, fieldwork activities, conferences, knowledge exchanges, and similar mechanisms.
2. Commercial transfer, which encompasses collaborative or contract-based research with industry, consulting services, technical assistance, licensing agreements, and intellectual property sales.
3. Formation of new enterprises (spin-offs).

Although technology transfer does not always follow a strictly linear pathway involving invention disclosure, patenting, and licensing [13], the conventional model still includes multiple stages, among which marketing plays a key role. At this stage, the objective is to identify potential industrial partners for licensing intellectual property or for joint research and development [5]. Nevertheless, these functions remain insufficiently developed in Brazil [6].

According to the [14], marketing is defined as "the activity, set of institutions and processes for creating, communicating, delivering and exchanging offerings that have value for customers, clients, partners and society at large." Within this context, technological marketing can be understood as the integration of technology transfer and marketing principles [15], and is also referred to as technological offering, which is considered a critical stage in the TT process [16].

In this study, the notion of technological offer refers to institutional practices within STIs aimed at promoting research outputs and intellectual property to transfer technologies either to firms or to individual innovators seeking to develop entrepreneurial ventures based on institutional intellectual assets. This process spans the entire continuum from establishing partnerships to the commercialization stage of technologies.

Technology transfer offices (TTOs) play a central intermediary role in TT, acting as bridges between STIs and industry by executing external marketing activities [17, 18] demonstrated that TTOs emphasizing relational engagement between academic institutions and firms tend to secure more licensing agreements than those primarily focused on transactional operations.

Regarding competencies within the TT domain, Mom, Oshri, and [19] reviewed European studies and identified three main strands of research on TTO skill sets: i) early studies emphasizing the importance of legal expertise for managing intellectual property rights and royalties; ii) studies highlighting technical-domain knowledge as essential for providing legitimacy and credibility to both the technology and the transfer process; and iii) more recent research stressing the growing importance of commercial and marketing competencies in technology transfer activities.

In the Brazilian context, [2] found that professionals with backgrounds combining research expertise and marketing-related skills tend to influence technology licensing outcomes positively. Conversely, although legal expertise is important for TTO operations, it does not appear to increase the number of licenses significantly.

Similarly, [5] reported that entrepreneurs believe TTO personnel should act less as traditional academics and more as negotiators and facilitators who understand industry perspectives. From a scientific perspective, TTO staff should possess strong knowledge of the research domain and understand the technology's potential application pathways. Academic managers, however, argue that the lack of marketing competencies and practices within TTOs hinders successful technology transfer. This highlights the need for personnel with marketing expertise, as many TTO teams are predominantly composed of patent attorneys or business lawyers rather than marketing professionals.

Technology transfer in Brazil

In the Brazilian context, scientific production is largely concentrated within Science and Technology Institutions (STIs), which depend predominantly on public funding. At the same time, private investment remains limited and is largely concentrated in a few large firms. This pattern reflects the country's historically established development model, which has discouraged private companies from engaging in high-risk innovation activities [20]. Despite the scale of public investment in research, Brazilian STIs still struggle to convert laboratory outputs into technologies that effectively reach end users and society. Only a limited number of cases exist in which research results are successfully transferred to partners capable of bringing innovations to market [21, 22]. This reality underscores the importance of research that facilitates the movement of knowledge generated in STIs toward firms that can transform it into innovation.

Recent evidence from [20] in the Brazilian innovation context further underscores the need to understand better the factors that hinder collaboration between STIs and companies. Addressing these barriers is essential to increasing the likelihood that academic technologies reach commercialization. The main obstacles to technology transfer in Brazil include: (1) a shortage of adequately trained personnel in technology transfer offices (TTOs) [7, 23]; (2) weak institutional culture supporting innovation and entrepreneurship within universities [24]; (3) insufficiently developed institutional mechanisms and procedures governing TT activities [7, 16]; (4) challenges associated with evaluating and pricing technologies [16, 24]; and (5) limited awareness of possible collaboration models between universities and industry [7]. Many of these constraints are closely linked to the performance and maturity of TTOs. [23] emphasize that strengthening interaction between universities and industry is essential for advancing institutional technology transfer processes. However, in Brazil, most TTOs are relatively new organizational structures that are still developing operational experience and institutional learning [2]. Similarly, [9] identified a key weakness in Brazilian TTOs: the absence of structured marketing strategies to manage and promote patents, largely due to the lack of specialized units responsible for these activities.

Overall, initiatives aimed at encouraging technology transfer from Brazilian universities to the market remain limited and often fragmented, spanning from early research stages to commercialization efforts. Systematic efforts to analyze market needs and industry demand remain rare, often resulting in technologies with low commercial appeal. The most commonly observed marketing practices in Brazilian institutions remain traditional, including participation in trade fairs and technical events, dissemination through academic or specialized publications, and media exposure via newspapers, television, or radio. In contrast, more strategic approaches—such as the development of tailored marketing plans for individual technologies to enhance commercialization outcomes—are rarely implemented. Additional barriers to effective marketing in academic environments include weak communication channels between universities and industry and limited visibility of collaboration opportunities [7].

Finally, given that technology transfer practices in Brazil are still at an early stage of development, institutions may benefit from adopting and adapting models from more mature systems with greater experience in TT processes [23]. In this direction, the present study aims to contribute to strengthening technological offering practices within the Brazilian context.

Materials and Methods

This investigation adopted a qualitative approach with a descriptive and exploratory orientation, operationalized through multiple case studies [25]. The empirical stage consisted of technical visits and interviews conducted with managers from technology transfer offices (TTOs) representing seven Brazilian public STIs. The interviewees were either the coordinators responsible for TT activities or professionals designated by them within this domain. To complement the primary data, secondary information was gathered from scientific publications and institutional websites, enabling triangulation. The integration of multiple data sources increased the consistency of the findings and strengthened the study's validity. **Table 1** identifies the STIs included in the study and presents the codes assigned to each interviewee.

Table 1. Interviews were conducted in the STIs selected for the study.

STI	TTO	State	Interviewee codes
State University of Campinas (UNICAMP)	Unicamp Innovation Agency (INOVA)	São Paulo	A1, A2, A3, A4
University of São Paulo (USP)	Innovation Agency of USP (AUSPIN)	São Paulo	B1
Paulista State University (UNESP)	UNESP Innovation Agency (AUIN)	São Paulo	C1
Federal University of Minas Gerais (UFMG)	Coordination for Technology Transfer and Innovation (CTIT)	Minas Gerais	D1, D2
Federal University of Paraná (UFPR)	Innovation Agency of UFPR	Paraná	E1
Federal Technological University of Paraná (UTFPR)	UTFPR Innovation Agency (AGINT)	Paraná	F1
Oswaldo Cruz Foundation (FIOCRUZ)	Technology and Innovation Management System of FIOCRUZ (GESTEC-NIT)	Rio de Janeiroa	G1

Note(s): aThe headquarters is in Rio de Janeiro, with units in other states of Brazil
Source: Prepared by authors

The institutions were selected based on an evaluation of their technological portfolios and performance outcomes. In particular, the selection considered indicators related to financial returns generated through the commercial exploitation of institutional inventions, reflecting differences in technology offering practices. Based on these criteria, the following institutions were included: State University of Campinas (UNICAMP), University of São Paulo (USP), Paulista State University (UNESP), and Federal University of Minas Gerais (UFMG). To broaden the analysis beyond the Southeast region, the Federal University of Paraná (UFPR) and the Federal Technological University of Paraná (UTFPR) were also incorporated. The Southeast region is recognized for presenting the most significant TT outcomes and for hosting more mature TTOs [26, 27]. It is worth noting that UFPR and UTFPR, both located in the state of Paraná in Southern Brazil, accounted for the highest number of invention patent filings in 2019. Additionally, UTFPR is the leading domestic depositor of computer programs in the country [28].

All universities analyzed are among the ten Brazilian public resident institutions with the highest number of invention patent applications recorded in 2019 [28]. The inclusion of FIOCRUZ aimed to incorporate the perspective of a public research institution outside the university system. According to [29], most studies addressing technology offering focus on licensing processes involving universities, whereas similar activities within non-university public research institutions remain insufficiently examined. Furthermore, FIOCRUZ stands out as a leading STI in public health in Latin America, and its intellectual property team received international recognition at the 2017 Global Counsel Awards.

The selection of institutions relied on multiple sources of information, including academic literature, media coverage, institutional documents available on STI websites, and data from governmental bodies and funding agencies.

Data from the interviewees were obtained through semi-structured interviews [30], guided by a previously validated protocol composed of open-ended questions addressing TT processes, based on the literature review. Most interviews were conducted face-to-face, except for the UNESP interview, which was conducted remotely due to the COVID-19 pandemic.

The interviews took place between September 2019 and June 2021, were recorded, and subsequently transcribed. Following [31] recommendations, content analysis was used as the primary analytical procedure. The interview data were coded and organized into predefined thematic categories representing relevant factors influencing TT, as presented in **Table 2**:

Table 2. Categories and codes used in the content analysis technique.

Categories	Codes
Outcomes of technology transfer	• TT agreements • Monetary returns
Professional characteristics of the technology transfer team	• Team size • Educational background • Competencies • Performance
Technology portfolio	• Development of the portfolio • Usefulness of the portfolio
Strategies for presenting technologies	• Internal identification of technologies • Internal selection of technologies • Strategies for promoting the portfolio • Methods to identify prospective partners • Methods to engage prospective partners
Licensing technologies to inventors and the creation of spin-offs	• Entrepreneurship policies • Conflicts of interest
Best practices and challenges	• Successes • Obstacles

Source(s): Prepared by authors

Two researchers conducted the interviews, while a third researcher was responsible for transcription and coding. The resulting materials were later reviewed by the interviewers to ensure accuracy, reduce potential bias, and address any missing elements. Excerpts from the interviews were incorporated into the results discussion to provide empirical support for the findings. The

study received approval from the appropriate research ethics committee, and all participating STIs and respondents provided formal consent by signing the required documentation.

Results and Discussion

Profile of the technology offer team and results of technology transfer

Table 3 presents the characteristics of the TTO teams involved in technology offering activities, together with the number of agreements established and the financial returns generated from transferred technologies, enabling a comparative examination across cases. Although STIs do not follow a uniform format for reporting these data, aligning them within a comparable time frame enables contextualizing TT outcomes. Overall, the evidence indicates that TTOs adopting proactive technology offering approaches and allocating resources to portfolio promotion and marketing activities achieve better TT performance.

Table 3. Profile of the TT teams and technology transfer (TT) results.

STI	TT team performance	Do you conduct active offerings?	The sector responsible for actively offering		The sector responsible for marketing	TT contracts executed		Financial income from TT	
			Name	Employees (no)		Number (no.)/Period	Source	Value/Period	Source
UNICAMP	Commercialization and Contracts	Yes	Partnerships	4	Institutional Relations and Communication	245 (2004–2020)	[32] (n.d)	R$13,281,685.42 (2005–2020)	[32] (n.d)
USP	Commercialization and Contracts	Yes	TT	5	Communication	37 (2013–2019)	[33] (n.d.), [34] (n.d.)	R$15,400,000.00 (2000–2019)	Inovação em números (n.d.)
UNESP	Commercialization and Contracts	Yes	TT	2	Entrepreneurship and Marketing	32 (2010–2020)	[34, 35]	Not informed	[34, 35]
UFMG	Commercialization and Contracts	Yes	Strategic Alliances Management	5	Communication	109 (Accumulated through December 2020)	Patentes e Transferência Tecnológica (n.d.)	R$8,131,077.00 (Accumulated through December 2020)	Patentes e Transferência Tecnológica (n.d.)
UFPR	Contracts	No	–	–	Communication	53 (Accumulated through September 2021)	Nossos Números (2021)	R$388,169.37 (2018–2020)	Relatório de atividades 2018 (n.d.), Relatório de atividades 2019 (n.d.), Relatório de atividades 2020 (n.d.)
UTFPR	Contracts[a]	No	–	–	–	1 (Accumulated through 2019)	Interview	None (through 2019)	Interview
FIOCRUZ	Contracts	No	–	–	–	10[b] (Accumulated through 2018)	Ávila (2019)	$3,500,00 (Only in 2020)	Interview

Note(s): aIt does not have an exclusive employee for technology transfer
bThe number refers to the licensed technologies, as there are no consolidated data on the number of contracts signed
Source(s): Prepared by authors

The interviews indicated that TTO professionals engaged in TT activities come from diverse academic and professional backgrounds, with a predominance of legal training. Traditionally, legal expertise has been prioritized, as observed in the cases of FIOCRUZ and UTFPR, where TT roles are performed exclusively by individuals with legal specialization.

Some TTOs restrict their role to formalizing agreements, whereas others devote effort to commercial engagement and active promotion of technologies. In certain institutions, dedicated groups with a commercial orientation have been established to manage technology offerings. These TTOs recruit professionals specifically tasked with interacting with companies and

supporting marketing and communication initiatives aimed at public visibility and media outreach. This approach aligns with the findings of [19] and [2], reflecting the growing recognition of commercially oriented skill sets within Brazilian TTOs. Conversely, other offices operate primarily reactively, responding only to demands initiated by researchers or external organizations. Nevertheless, some institutions—such as FIOCRUZ—are implementing more proactive strategies to address this gap.

[9] previously reported the absence of dedicated marketing units or structured planning for marketing strategies in the TTOs of UFMG, UNICAMP, and USP. In contrast, the present findings indicate that these institutions have begun to incorporate marketing planning, suggesting an evolution in their operational approach. In this regard, interviewee C1 emphasized the relevance of a specialized unit responsible for communication and marketing within the TTO:

This function is essential to us because it is not feasible to handle negotiations, engage companies, and manage marketing efforts simultaneously. (…) It is particularly challenging, especially since many technologies require professionals trained in areas such as advertising, communication, or dissemination.

Supporting this view, A2 pointed out that excessive emphasis on intellectual property protection—reflected in the allocation of most financial and human resources to this area—results in insufficient attention being given to technology offering:

At one point, we had eight analysts dedicated to intellectual property. However, having eight people focused on IP makes little sense if only one person is responsible for promoting patents. A better distribution of resources is necessary.

Another finding relates to the reliance of Brazilian TTOs on centralized institutional communication and marketing services. Since these services prioritize broader institutional communication, technology-promotion activities often receive limited attention, thereby reducing their effectiveness. Furthermore, the study shows that more advanced TTOs, in terms of TT outcomes, invest in teams dedicated exclusively to marketing-related activities. In line with this, the authors recommend that research institutions recruit professionals with business expertise for TTO roles [5], a practice already adopted by UNESP. As highlighted by C1: "the professionals selected for the transfer area are individuals with business knowledge and experience, meaning they have worked in companies (…), have connections with the private sector, and have been involved in managing business activities."

Additionally, leadership with corporate backgrounds has strengthened relationships between TTOs and external partners. Experience in the private sector enhances understanding of market dynamics, negotiation complexity, and the flexibility required in TT processes [5]. This type of leadership profile was identified at UNICAMP and UFMG, where directors have professional experience in firms from countries with well-established innovation cultures. Interviewees from these institutions confirmed the importance of this strategic background in achieving improved results.

Teams at UNICAMP and UFMG also stressed the importance of coordinated and multidisciplinary efforts for successful TT, consistent with the competencies identified by [19] and [2]. As D1 explained: "When carrying out a technology negotiation, it is necessary to consider three key dimensions: commercial, technical, and legal aspects."

These findings reinforce the relevance of marketing capabilities in enhancing TTO performance. Offices that adopt structured marketing strategies tend to enter more TT agreements and generate higher licensing revenues than those that do not.

Finally, the analysis revealed that institutions in the Southeast region achieve the highest financial returns. This outcome can be attributed to institutions in this region having more extensive experience with technology commercialization processes, as previously identified by [8] in São Paulo ICTs.

Portfolio of technologies

A key obstacle to fostering collaboration between STIs and companies is insufficient visibility into available opportunities for cooperation [7]. One mechanism to mitigate this limitation is the development of a technology portfolio. In the case of UTFPR, its website provides only a list of patent applications submitted to the National Institute of Industrial Property (INPI), making it the only institution in the sample without a structured technological portfolio. In contrast, the remaining STIs present their technologies through more elaborate portfolio formats.

Across these portfolios, several elements were identified, including visual materials, explanatory videos, content organized by thematic areas or technological maturity stages, and bilingual presentation formats. Although uncommon, UNICAMP reported a case in which a Chinese company expressed interest after viewing an image in the portfolio, underscoring the potential value of visual components as complements to textual descriptions. Nevertheless, instances of companies independently approaching STIs remain limited, reflecting the absence of consistent institutional efforts to promote portfolio visibility actively. As a result, respondents generally agreed that the portfolio itself does not function as an entry point but rather as a supporting instrument in interactions with potential partners. In other words, the effectiveness of the portfolio depends on complementary promotional actions. As highlighted by respondent A1: "Simply displaying the [technological] profile is insufficient; without structured marketing and communication efforts, the portfolio alone does not generate results."

Another point raised by most respondents concerns the preparation of technological summaries or standards, which translate technical characteristics into more market-oriented language. This task is typically carried out jointly by researchers and TTO

staff. UNICAMP stands out as the only institution that outsources this activity to an external company, allowing its internal team to concentrate more on activities related to promoting technologies.

A recurring feature among the analyzed portfolios is the emphasis on patents and other protected intellectual assets. Although some STIs publicly display their portfolios, the promotion of institutional competencies for partnership development generally occurs only upon request from researchers or when companies initiate contact. Expanding this approach to include earlier stages of research could strengthen collaboration with industry and increase opportunities for licensing and innovation development, as suggested by [9]. Interviewee B1 reinforced this view: "Within the Brazilian context, projects that are not collaboratively developed from the outset are unlikely to progress toward practical application for several reasons."

In this regard, USP has recently implemented initiatives to map its competencies and services, while actively identifying industry demands to foster partnerships from the early phases of research. This approach includes activities that enable companies to become familiar with university research while also allowing them to communicate their needs to researchers. Such efforts reflect a relationship-oriented marketing perspective, as proposed by [18] and observed at UNICAMP by [6]. USP integrates an innovation hub into its portfolio that brings together information on research projects, laboratories, expertise, patents, and startups within its innovation ecosystem, thereby enhancing visibility of its diverse collaboration opportunities.

Strategies for the offer of technologies

The findings indicate that technology identification typically begins when inventors formally disclose their inventions to the TTO. In most cases, all patented technologies are incorporated into the portfolio, with priority given to those at more advanced stages of development or those considered to have greater commercial potential for proactive promotion. In more structured TTOs, such as UNICAMP, inventions undergo systematic evaluation processes that consider patentability, market potential, and the characteristics of the development team. Since the study by [6], UNICAMP has progressed in establishing a more selective and strategic patenting policy. Interviewee A1 emphasized this perspective: "We do not view patents as an end in themselves; rather, we treat them as components of business opportunities." Similarly, A2 noted a shift in institutional focus: "The objective is not necessarily to reduce the number of patent filings—although this may occur—but to direct efforts toward effective commercialization."

STIs adopt multiple approaches to promote technologies in the market **(Table 4)**. According to the interviews, the most effective strategy for achieving TT outcomes is the proactive engagement with potential partners. As explained by A1: "It is necessary to reach out actively and present technologies; waiting for companies to initiate contact is not sufficient." UNICAMP has developed a structured methodology, supported by a dedicated team responsible for designing and implementing offering strategies and meeting licensing targets. In contrast, UFMG emphasizes maintaining ongoing relationships with companies through regular monthly communications highlighting newly protected technologies.

Table 4. Technology offering strategy

STI	Strategy
UNICAMP	• Digital technology portfolio, events, STI–industry linkage platform, press communications, social media, and the "UNICAMP Challenge" entrepreneurship contest that builds business models for patented technologies in the portfolio • Proactively contacts potential partners via email and telephone • Focuses on identifying high-quality partners rather than maximizing the number of outreach attempts
USP	• Online technology portfolio and events • Active outreach to potential partners through email and phone • Emphasizes wide-ranging company targeting, aiming at 20 firms per technology, both nationally and internationally
UNESP	• Web-based portfolio, events, STI–business networking platforms, international collaboration initiative connecting with French firms, internal acceleration program, and analysis of large-company environments to monitor product launch trends • Direct contact with potential partners via email and telephone
UFMG	• Online portfolio, events, STI–company engagement platforms, and email-based marketing • Direct outreach to potential partners through email and phone
UFPR	• Online portfolio system • Posting technology offers on the institutional website • Uses INPI's "Patent License Offering for exploration purposes" service, which reduces annual fees paid to INPI
UTFPR	• Publication of offers on the institutional website or in the Official Federal Gazette, selecting only technologies assessed as having higher transfer potential
FIOCRUZ	• Online portfolio and events • Implementation of proactive outreach strategies, including targeted actions by TTOs to approach potential partners, replacing passive models based on researcher requests or company-initiated contact

Source(s): Prepared by authors

In addition to UNICAMP and UFMG, USP and UNESP also implement proactive approaches in engaging companies. The remaining institutions tend to operate more reactively, responding to requests from inventors or to inquiries from firms interested in STI technologies. To identify potential partners, STIs employ a variety of methods, including online searches (e.g., Google), professional networks such as LinkedIn, competitive intelligence tools, and patent databases. These approaches may involve both free and paid platforms, such as Questel Orbit, as well as recommendations from inventors and alumni working in industry.

Based on interview data, the initial step in engaging companies involves identifying appropriate internal contacts, such as professionals responsible for innovation or business development. This process represents a significant challenge, as it relies heavily on established networks or requires substantial time investment to avoid ineffective communication channels. Consequently, some STIs that offer proactive technology solutions use databases of contacts developed through prior relationships, as well as paid tools, to facilitate access to decision-makers.

However, in many institutions, inventors themselves play a central role in identifying potential markets, recommending suitable partners, and directly promoting technologies to key individuals within companies. They are also frequently approached by companies during events or through personal networks. In some cases, the responsibility for initiating contact with potential partners lies almost entirely with the inventors. These findings are consistent with [8], who identified inventors as primary actors in the search for commercial partners.

Offer for inventors and creation of spin-offs

A pathway for technology transfer (TT) that has been increasingly promoted within Brazilian STIs is the establishment of spin-offs or startup companies based on internally developed inventions. In this context, A2 noted: “The intention is to direct efforts not only toward transferring technologies to existing firms, but also toward enabling the creation of new ventures derived from these technologies, thereby strengthening the entrepreneurial dimension.”

Despite this emphasis, offering technologies to newly created firms involving STI researchers as partners is accompanied by considerable uncertainty, particularly from a legal perspective. As explained by A1: “A recurring constraint we have faced, and continue to face, concerns the intention to develop spin-offs, while still lacking clarity on how to make technologies available to the inventors themselves.” Similarly, B1 highlighted institutional limitations regarding formal agreements: “I can’t establish contracts—whether partnerships or licensing arrangements—with a company in which one of the partners is also a faculty member at our institution.” The authors identify this type of conflict of interest as a critical barrier to fostering academic entrepreneurship.

Institutional policies vary across STIs. At UNICAMP, UNESP, UFMG, and UFPR, researchers are not required to leave their academic positions to license technologies to companies in which they are partners; however, they are not permitted to assume executive roles, in accordance with legal and internal regulations. In contrast, at USP, researchers must step away from their academic duties to participate in such arrangements. In this case, the institution interprets existing legal frameworks as restricting licensing to firms in which public employees hold ownership. At UTFPR, this issue was still under internal discussion at the time of the study.

Addressing conflicts of interest is essential to enabling cooperation between STIs and companies involving researcher participation while safeguarding the public interest. Resolving this challenge is particularly important for overcoming the so-called “innovation valley of death.” In this regard, B1 emphasized: “Most technologies are unlikely to advance if access to university laboratories and infrastructure is restricted.” When asked about formal regulations governing the relationship between STIs and companies involving public employees, only respondents from UFMG and UNICAMP confirmed the existence of established policies. Among the institutions studied, UNICAMP stands out for its innovation policy, which explicitly allows co-development between the STI and a company licensing a technology, even when the inventor remains affiliated with the institution. This framework provides significant support for emerging spin-offs, which often lack sufficient resources to advance technological development independently.

By contrast, UFMG had not yet implemented co-development agreements, service provision, or the leasing of laboratory space to companies involving its researchers, as such arrangements are viewed as potential conflicts of interest. In these situations, the institution advises companies to collaborate with external partners to continue technological development. Meanwhile, FIOCRUZ has an innovation policy permitting the licensing of technologies to firms that include the inventor as part of their team. However, the absence of detailed internal regulations creates uncertainty regarding the conditions governing the researcher’s role and the company’s continued collaboration with the STI. Specifically, it remains unclear whether the researcher must resign from the institution or whether the company may continue development activities in partnership with the STI.

Establishing clear rules for managing conflicts of interest can enhance legal certainty for both institutions and researcher-entrepreneurs. According to [36], such regulatory frameworks not only support the creation of spin-offs but also encourage greater researcher involvement in TT activities. Increased participation, in turn, can lead to more licensing agreements and associated revenues.

Good practices and challenges in the technology offer process

The examination of both achievements and obstacles reported by interviewees highlights key themes related to effective practices and persistent challenges in technology offering within STIs. Although these findings are context-specific and cannot be generalized, they provide valuable insights for institutional managers, funding bodies, and policymakers. The issues identified reflect the experiences of the institutions analyzed and are summarized below:

Marketing of technologies

Institutions with more advanced technology offering processes attribute their success in licensing activities to the adoption of structured methodologies that emphasize proactive engagement with potential partners, supported by teams dedicated exclusively to commercial functions. In contrast, the absence of organized marketing strategies represents one of the primary barriers to improving licensing outcomes. As emphasized by E1: "The main challenge lies in promoting the technology itself—in other words, effectively bringing it to the market through proper marketing efforts."

Restructuring the TT area

The organizational structure responsible for TT should extend beyond a purely legal focus and incorporate a dedicated commercial function. As suggested by E1: "the TT unit needs to be expanded and divided into two main components—legal and commercial (…) with a strong emphasis on the commercial side (…) whereas currently, most structures remain predominantly legal."

Offering STI technologies to inventors

The establishment of spin-offs involving STI researchers as company members depends on the existence of clearly defined institutional innovation policies, particularly those that address and regulate potential conflicts of interest.

Degree of maturity of the technologies

In many cases, technologies developed within STIs do not reach the maturity levels required by companies, creating a need for additional financial resources and access to the infrastructure provided by STIs and funding agencies to further develop these technologies and enhance their market appeal.

Internationalization of the portfolio

One of the main constraints identified is TTOs' limited experience with internationalization processes. In specific fields, such as biotechnology, the number of domestic companies capable of absorbing new technologies is small, making it necessary to identify partners abroad. This situation requires TT teams to develop the capabilities to engage with international firms, including managing complex, demanding negotiation processes.

Valuation of technology

Determining the economic value of technologies remains challenging, as reliable, standardized valuation methods are difficult to implement. Most TTOs lack specialized teams to perform this function. Among the institutions studied, only UFMG reported having both a dedicated team and a structured methodology for technology valuation.

Expand disclosure on STI-company interaction opportunities

Although multiple forms of collaboration between STIs and companies exist, they are often not widely recognized by industry actors. This gap highlights the need for stronger marketing and communication efforts by TTOs to increase awareness of these opportunities.

Lack of mapping of companies' demands

When presenting their portfolios to industry, STIs often attempt to match existing technological solutions with potential applications rather than developing solutions in response to clearly identified market needs. This reactive approach limits alignment with industry demand and could be further explored by experts. As noted by F1: "There is little benefit in developing a solution first and only afterward trying to find companies that might be interested." This observation reflects the ongoing challenge of reconciling market-oriented demands with STIs' broader mission, which includes generating knowledge and addressing societal needs. However, such outputs are not always aligned with immediate commercial interests.

Demystify the focus on the number of patents

An emphasis on quantitative performance indicators—particularly the number of patent applications filed—rather than on actual licensing outcomes may lead to the accumulation of low-quality portfolios with high maintenance costs. As highlighted

by F1: “We operate under quantitative targets, such as submitting around 100 applications per year, whether patents or other forms of registration.” This illustrates the continued prioritization of numerical metrics over qualitative indicators, such as successful licensing agreements or technologies effectively transferred to the market.
The identified effective practices are not uniformly implemented across all institutions. What is considered a strength in one STI may still represent a challenge in another. This variation reflects the significant differences in maturity levels among Brazilian TTOs, as also observed by [6].

Conclusion

The findings of this study indicate that, despite the growing relevance of technology transfer (TT), there remains a significant performance gap among Brazilian TTOs. More advanced TTOs tend to allocate greater resources to proactive technology offerings and marketing activities, supported by specialized teams dedicated exclusively to these functions. As a result, these institutions achieve stronger TT outcomes. In contrast, less mature TTOs often lack active promotion strategies and rely heavily on inventors to identify potential partners. Rather than initiating engagement, they tend to adopt a reactive stance toward the commercialization of intellectual property. In this context, experts emphasize the need to reorganize TTO structures and strengthen technological marketing capabilities to improve TT effectiveness in Brazil.
The study also highlights the importance of adopting a regional perspective to reduce disparities in TTO performance. For example, the results obtained from institutions in São Paulo differ significantly from those observed in Paraná, where TT activities are still in earlier stages of development. Public managers could consider adapting international strategies, such as the creation of professional, for-profit TTOs, as exemplified by Oxford University in England. Such entities could operate across multiple STIs within the same region, thereby pooling resources and supporting institutions with more limited capabilities.
Furthermore, the results point to key factors that can enhance TT from STIs to companies. One important aspect is the development of intellectual property policies focused not only on protection but also on transforming inventions into viable business opportunities. This requires the presence of skilled teams dedicated to technology promotion, as well as the implementation of structured marketing strategies for institutional portfolios. Balancing efforts between intellectual property management and active TT is therefore essential. Additionally, maintaining continuous engagement with companies is crucial for understanding market needs and aligning research activities with real-world demands.
Some of the STIs analyzed are already advancing in the field of entrepreneurship, which is still relatively new within public management contexts. This development calls for greater exchange of experiences among institutions and broader dialogue with funding and regulatory bodies. In particular, the creation of spin-offs often raises concerns related to conflicts of interest—for instance, when a researcher is both the inventor of a technology and a partner in the company responsible for its commercialization in collaboration with the STI. As observed in other countries, the key challenge lies in establishing legal frameworks that provide certainty while safeguarding institutional interests. Without appropriate regulation, many technologies may fail to reach society. Therefore, it is necessary to develop clear institutional guidelines that prevent situations in which researchers must choose between remaining at the STI or participating in the company. Such restrictions may lead to significant losses, as both STIs—through licensing revenues—and companies would benefit from the continued involvement of inventors in the development process of spin-offs.
This study offers relevant insights for TT researchers, STI managers, funding agencies, and policymakers. It identifies both effective practices and persistent challenges in technology offering processes within TTOs. In doing so, it contributes to expanding the still limited body of literature on marketing and innovation in TT between research institutions and companies in developing countries, as noted by previous studies [7, 9, 10]. Additionally, the findings support the formulation of public policies and strategies to strengthen and sustain STI–company collaborations in Brazil.
Given the limitations of this study, further research is recommended. The results cannot be generalized, as they are based on the specific contexts of the institutions analyzed, particularly considering that only one non-university research institution was included. Future studies could examine technology and competency offering strategies in a broader range of public and private research organizations beyond universities. It is also recommended to investigate the company’s perspectives on partnership requirements, development expectations, and the barriers associated with TT through interactions with STIs.

Acknowledgments: The authors acknowledge the Inova Fiocruz Program of the Oswaldo Cruz Foundation for providing financial support for this research.

Conflict of interest: None

Financial support: None

Ethics statement: None

References

1. Bozeman B, Rimes H, Youtie J. The evolving state-of-the-art in technology transfer research: revisiting the contingent effectiveness model. Res Policy. 2015;44(1):34-49.
2. Soares TJ, Torkomian ALV. TTO's staff and technology transfer: examining the effect of employees' individual capabilities. Technovation. 2021;102:102213.
3. Brasil. Lei nº 13.243, de 11 de janeiro de 2016. Dispõe sobre estímulos ao desenvolvimento científico, a pesquisa, a capacitação científica e tecnológica e a inovação. Diário Oficial da União. 2016 jan 12.
4. Brasil. Lei nº 10.973, de 2 de dezembro de 2004. Dispõe sobre incentivos à inovação e à pesquisa científica e tecnológica no ambiente produtivo e dá outras providências. Diário Oficial da União. 2004 dez 3.
5. Siegel DS, Waldman DA, Atwater LE, Link AN. Commercial knowledge transfers from universities to firms: improving the effectiveness of university-industry collaboration. J High Technol Manag Res. 2003;14:111-33.
6. Dias AC, Porto GS. Technology transfer management in the context of a developing country: evidence from Brazilian universities. Knowl Manag Res Pract. 2018;16(4):525-36.
7. Sousa D, Zambalde A, Souki G, Veroneze R. Marketing myopia in Brazilian public universities: an empirical study involving academicians. J Technol Manag Innov. 2018;13(3):12-23.
8. Garnica LA, Torkomian ALV. Gestão de tecnologia em universidades: uma análise do patenteamento e dos fatores de dificuldade e de apoio à transferência de tecnologia no Estado de São Paulo. Gest Prod. 2009;16(4):624-38.
9. Malvezzi FA, Zambalde AL, Rezende DC. Marketing de patentes à inovação: um estudo multicaso em universidades brasileiras. Rev Bras Mark. 2014;13(5):109-23.
10. Veroneze RB, Zambalde AL, Sousa DD, Renno AS. As relações entre a universidade e o mercado sob a perspectiva do marketing: uma revisão sistemática de literatura. Rev Foco. 2017;10(1):195-220.
11. Bozeman B. Technology transfer and public policy: a review of research and theory. Res Policy. 2000;29(4):627-55.
12. Sharma M, Kumar U, Lalande L. Role of university technology transfer offices in university technology commercialization: case study of the Carleton university foundry program. J Serv Res. 2006;6:109-39.
13. Hayter CS, Rasmussen E, Rooksby JH. Beyond formal university technology transfer: innovative pathways for knowledge exchange. J Technol Transf. 2018;45(1). doi:10.1007/s10961-018-9677-1
14. American Marketing Association. Definitions of marketing [Internet]. Chicago: AMA; 2017 [cited 2026 May 27]. Available from: https://www.ama.org/the-definition-of-marketing-what-is-marketing/
15. Vieira OV. Marketing tecnológico, uma ferramenta de transferência de tecnologia: a experiência da Embrapa Soja [Internet]. Londrina: Embrapa Soja; 2003 [cited 2026 May 27]. Available from: https://www.embrapa.br/busca-de-publicacoes/-/publicacao/453914/marketing-tecnologico-uma-ferramenta-de-transferencia-de-tecnologia-a-experiencia-da-embrapa-soja
16. Closs L, Ferreira G, Sampaio C, Perin M. Intervenientes na transferência de tecnologia universidade-empresa: o caso PUCRS. RAC. 2012;16(1):59-78.
17. Etzkowitz H, Webster A, Gebhardt C, Terra BRC. The future of the university and the university of the future: evolution of ivory tower to entrepreneurial paradigm. Res Policy. 2000;29(2):313-30.
18. Weckowska DM. Learning in university technology transfer offices: transactions-focused and relations-focused approaches to commercialization of academic research. Technovation. 2015;41-42:62-74.
19. Mom TJM, Oshri I, Volberda HW. The skills base of technology transfer professionals. Technol Anal Strateg Manag. 2012;24(9):871-91.
20. Leal CIS, Figueiredo PN. Inovação tecnológica no Brasil: desafios e insumos para políticas públicas. Rev Adm Pública. 2021;55(3):512-37.
21. Santos MER, Torkomian ALV. Technology transfer and innovation: the role of the Brazilian TTOs. Int J Technol Manag Sustain Dev. 2013;12(1):89-111.
22. Almeida MMJ, Luz MCV, Quintella RH. Relação universidade-empresa: perfil dos contratos de tecnologia e sua distribuição regional segundo dados do FORMICT. Exacta. 2020;18(4):799-819.
23. Simões FS, Santos WPC. Análise dos fluxos de transferência de tecnologia de universidades públicas brasileiras, casos de sucesso: UnB e Unicamp. Cad Prospecção. 2018;11(3):741-56.
24. Chais C, Ganzer PP, Olea PM. Technology transfer between universities and companies: two cases of Brazilian universities. Innov Manag Rev. 2018;15(1):20-40.
25. Gil AC. Como elaborar projetos de pesquisa. 4th ed. São Paulo: Atlas; 2002.
26. Ministério da Ciência, Tecnologia, Inovações e Comunicações (BR). Relatório FORMICT ano-base 2018: política de propriedade intelectual das instituições científicas, tecnológicas e de inovação do Brasil [Internet]. Brasília: MCTIC;

2019 [cited 2026 May 27]. Available from: https://antigo.mctic.gov.br/mctic/opencms/tecnologia/propriedade_intelectual/formict_propriedade_intelectual.html

27. Fórum de Gestores de Inovação e Transferência de Tecnologia (FORTEC). Relatório anual da Pesquisa FORTEC de Inovação – ano base 2019 [Internet]. São Paulo: FORTEC; 2020 [cited 2026 May 27]. Available from: https://fortec.org.br/wp-content/uploads/2021/01/Relatorio_anual_Ano_Base_2019.pdf
28. Instituto Nacional da Propriedade Industrial (BR). Ranking dos depositantes residentes em 2019 [Internet]. Rio de Janeiro: INPI; 2020 [cited 2026 May 27]. Available from: https://www.gov.br/inpi/pt-br/acesso-a-informacao/pasta-x/estatisticas-preliminares/arquivos/documentos/ranking-maiores-depositantes-residentes-2019.pdf
29. Avila LK. Patentes e licenciamento: caso da Fiocruz [dissertation]. Rio de Janeiro: Instituto de Tecnologia em Imunobiológicos (Bio-Manguinhos); 2019.
30. Cruz Neto O. O trabalho de campo como descoberta e criação. In: Minayo MCS, organizer. Pesquisa social: teoria, método e criatividade. Petrópolis: Vozes; 2002. p. 51-66.
31. Bardin L. Análise de conteúdo. São Paulo: Edições 70 LDA/Almedina Brasil; 2016.
32. Agência de Inovação da Unicamp. Relatório anual 2020 [Internet]. Campinas: Inova Unicamp; 2020 [cited 2026 May 27]. Available from: http://da74cdc.contato.site/relatorio-2020
33. Universidade de São Paulo. Anuário estatístico 2019 [Internet]. São Paulo: USP; 2019 [cited 2026 May 27]. Available from: https://uspdigital.usp.br/anuario/br/acervo/AnuarioUSP_2019.pdf
34. Universidade Estadual Paulista "Júlio De Mesquita Filho". Anuário estatístico 2020. São Paulo: UNESP; 2020.
35. Universidade Estadual Paulista "Júlio De Mesquita Filho". Anuário estatístico 2021. São Paulo: UNESP; 2021.
36. Caldera A, Debande O. Performance of Spanish universities in technology transfer: an empirical analysis. Res Policy. 2010;39(9):1160-73.