



Report on survey of Brazilian Technology Transfer Offices (TTOs)

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Completed as part of the Intellectual Property Commercialisation: Phase II project

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Dr Finbarr Livesey

University of Cambridge

tfl20@cam.ac.uk

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Executive Summary

This report provides a summary of the results of a survey of technology transfer offices (TTOs) in Brazil carried out at the beginning of 2014 as part of the *Intellectual Property Commercialisation: Phase II* project sponsored by the UK's Foreign and Commonwealth Office (FCO) and completed by Cambridge Enterprise. The aim of the survey was to better understand how TTOs in Brazil perceive their institutional environment and to probe their self-reported strengths and weaknesses.

Members of 193 TTOs across Brazil were invited via email to participate and the survey was delivered online via SurveyMonkey. 33 of the 193 TTOs contacted responded, a 17% response rate.

The key messages from the survey include -

- That **mandatory patenting** of disclosures **may not reflect the 'natural' drop-out** rate from disclosure to patent and may be counter productive
- **Commercialisation** may be **thought of narrowly** (licencing patents) by TTOs rather than broadly (including spin-outs and consultancy)
- **Institutional support may be weak** in some universities, in terms of inclusion in strategies and funding provided
- There is a perceived **lack of domestic and international demand** for Brazilian technology from universities
- There are **weak links to follow-on financing** to scale technologies once out of the universities
- **TTOs may need help in developing commercial and technical skills** to better manage the commercialisation process as they do not believe they possess these skills in depth
- The opinion of this sample is that **the 2004 Innovation Law needs to be improved**

There are significant regional differences in the responses to the survey which are important to acknowledge. These include –

- Strong links to venture capital in the **South** compared to other regions
- Incentives for researchers and levels of disclosure thought to be very low in the **North East** and the **South**
- The **South and South East** are very negative about using the movement of people to affect technology transfer
- The **South** has a belief in the use of spin-outs to support transfer
- The TTOs in the **North East** do not believe they are included in their universities' strategies

- In terms of skills in the TTOs the **North East** has the lowest reported technical skills and the **South East** has the lowest reported commercial skills

It is hoped that this report provides a new perspective on the attitudes and environment of TTOs in Brazil and will support improvements in their performance and in rates of innovation and growth across the economy.

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Introduction

The significant changes to the Brazilian innovation ecosystem over the past decade and more have attempted to achieve a step change in rates of innovation and growth for the country. The introduction of the Innovation Law in 2004 is seen as a watershed as it changed the relationship between universities and industry, mandating the founding of technology transfer offices (TTOs) and allowing more flexibility in how research and knowledge moved from universities into the private sector.

Unfortunately while there have been significant improvements in science and technology it has been commented that Brazil "... still lags miserably in innovation ..." (Botelho 2011). Investment in R&D while rising is seen as being too low as a percentage of gross domestic product (GDP) compared to leading and competitor nations. As a key interface in the innovation system, there are ongoing concerns that the structures that are in place to facilitate technology transfer between universities and industry are not working as effectively as they could.

As part of the Intellectual Property Commercialisation project: Phase II sponsored by the UK's Foreign and Commonwealth Office (FCO) we undertook a survey of Brazilian technology transfer offices (TTOs) in order to understand from their perspective what issues may need to be addressed to move Brazil forward. The focus of this work was to get beyond what has traditionally been covered in governmental or academic surveys, typically outcome measures of disclosures and patents, and to understand how the TTOs viewed their world.

This report provides an overview of relevant previous work to contextualise the approach taken, an explanation of how the survey was developed and disseminated, a discussion of the headline results from the survey and finally a broad discussion on how the different messages from the survey can be brought together.

It is hoped that the report provides a useful input to the ongoing discussions and debates on how to further improve Brazil's innovation performance and potentially that it can act as a baseline for further attitudinal work on the structure and performance of technology transfer within the country.

Acknowledgements

We would like to thank Inova, and in particular Vanessa Regina Sensato Russano, for their assistance in this work. They provided critical support in translation of the survey so that it was immediately accessible for professionals in the technology transfer offices across the country. Their database of TTO contacts also made targeting of the survey possible and ensured that we received a set of responses that allowed for analysis and comment. Our sincere thanks to Vanessa and her team for all of their support.

Development of the survey

Previous surveys of technology transfer

Previous surveys of technology transfer activities come in many different forms. An early example is Carlsson's (2002) mail and interview based survey of nine US universities' technology transfer activities. The survey covered a number of topics using 31 questions, including the organisation, staffing, funding, and expertise within the TTO. The survey was essentially descriptive in its content and the results of the attached paper depend more heavily on the database from AUTM rather than the primary data generated through the survey. Another example is that of Meseri (2001) which again was an interview based survey of six Israeli technology transfer offices. This paper focused more on the selection criteria for choosing research to move across the university-industry boundary and what the success factors were for such projects.

The most directly relevant previous survey is that completed by Povia and Rapini (2010) which investigated what was been transferred from Brazilian universities and using what mechanism using the Research Group Directory of CNPq. 558 group leaders across Brazilian universities were sent a questionnaire on their technology transfer activities and roughly 30% responded. The most interesting result from this survey is that the mechanism for transfer was predominantly through reports (70%) and consultancy (42%) whereas patents were used in technology transfer by 14% of the respondents.

Current survey

The aim of this survey is to get a better understanding of how technology transfer offices (TTOs) in Brazil perceive their environment as a key to their effectiveness. This means that a process model, using inputs such as funding linked to outputs such as patents, is not an effective way forward. Instead we need to have a set of attitudinal or perception questions that broadly test the context in which the TTOs are operating and their capabilities.

In order to achieve this the survey used in this work has two elements – a set of what could be referred to as traditional outcomes questions (for example of number of patents) and a set of attitudinal or perception-based questions. The full survey is given in Appendix 1 which clearly shows the difference between more traditional data questions (such how many staff does the TTO have) and the attitudinal questions. In the latter case respondents were asked their level of agreement or disagreement to each statement on a five point Likert like scale which was structured as follows - Strongly Disagree, Disagree, Neither agree nor disagree, Agree, Strongly Agree.

The survey was developed based on desk research of previous studies of technology transfer and was then reviewed by members of the larger project team from Cambridge Enterprise and seniors from Inova. This lead to a number of changes for readability and length as well as removing some redundancy in the questions. The survey was translated into Portuguese and prepared in SurveyMonkey to be accessible online for respondents.

Survey sample

The survey was sent to 193 technology transfer offices across Brazil via email which included an invitation to take the full survey via SurveyMonkey.¹ The contacts details for the 193 TTOs was provided by Inova and ensured we have coverage across all regions of the country and were directly targeting the relevant people in each organisation. A reminder email was sent two weeks later and a final reminder was sent five days before the survey was closed. The survey was open and accepted responses for four weeks in total from the end of January to the end of February 2014.

Overall 33 TTOs responded providing data that could be used which was a response rate of 17%. While there is no such thing as an average technology transfer office, to give some sense of the type of respondent the 'average' respondent to this survey had the following characteristics –

- Established in 2006
- Attached to a university with 1000 faculty
- Has 7 staff
- 2 staff hold advanced degrees
- 1 person is specialised in intellectual property
- 2 staff left the TTO in the past year (turnover)
- On average dealing with 17 disclosures and 10 patents per year

This average masks very significant variation between the offices in the sample, for example the number of staff reported in the TTO varied between 1 and 36. However the sample is felt to reflect the broad set of contexts in which Brazilian TTOs operate and so the summary results of the survey should provide a relevant overview of the opinions held by TTOs.

¹ www.surveymonkey.com.

Key findings from the survey

The summary results for the survey are given in full in Appendix 2 and this section brings together the key messages that come from the data.

30% drop out rate from disclosure to patent

There is a flow from a disclosure coming to the TTO through to whether it is patented and then whether it is taken up in the form of a licence or other transfer. For this set of TTOs there is a 30% drop out between what is brought as a disclosure and what is thought appropriate to patent. This calls into question any sense of mandatory patenting of all disclosures and indicates that there is weak selection happening at the TTOs at the point where academics are bringing new research outputs to the office.

However this should not be surprising and in fact may represent too weak a first barrier as compared to the UK this rate of drop out is low. Figure 1 shows over the past decade that the conversion rates² in a given year remain relatively stable.

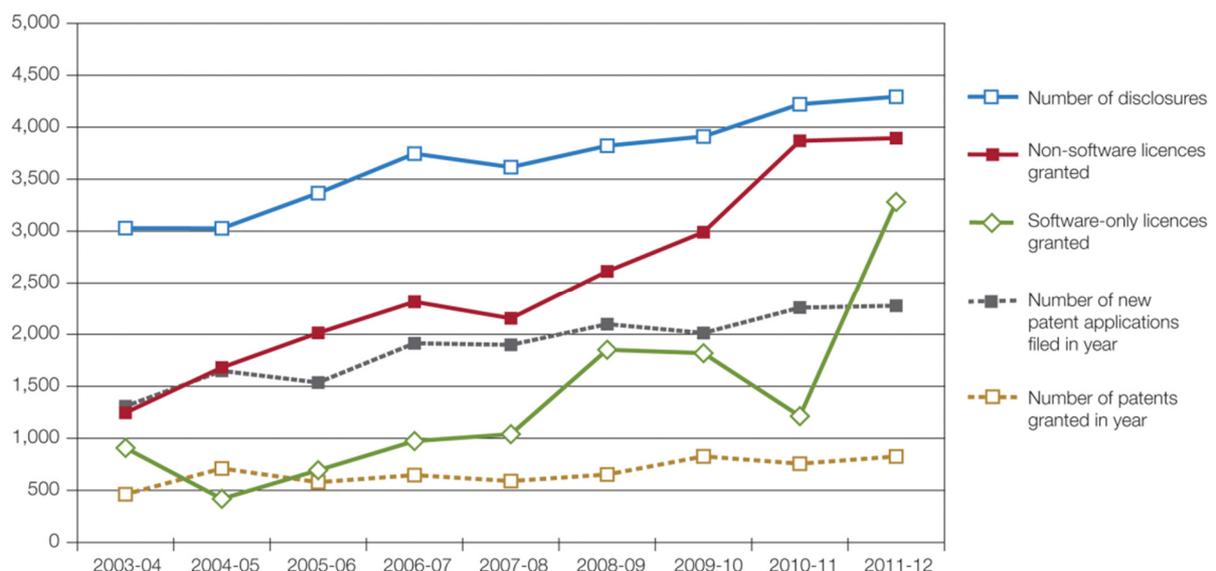


Figure 1 – UK disclosures and patents 2003 – 2012 (HEFCE 2013)

Comparing the number of disclosures to the number of new patent applications in a given year it appears that the patent applications are half the number of disclosures. This may reflect the fields in which the disclosures originate, as some fields are more or less amenable to patenting, but it also represents a decision on which disclosures warrant patenting. It looks as if this ‘natural’ drop-out rate is relative stable at 50% and so the drop-out rate for our sample of Brazilian TTOs at 30% may be too low.

² Strictly speaking these are not conversion rates as disclosures in a given year may not be patented for a number of years. However, for simplicity comparing the in-year numbers gives a general sense of the conversion rates from disclosures to patents.

There is also a question of whether patenting activity should target national or international coverage, as for this sample the ratio of Brazilian to international patenting is 9:1. Depending on the mission of each institution this balance needs to be carefully considered.

The interpretation of commercialisation may be too narrow

Early conversations on technology transfer and commercialisation focused quite heavily on patenting, both as a process that could be monitored and measured and in a belief that this was the best way to package new knowledge to take it from universities to companies. That view is no longer dominant, as other routes including spin-outs and consultancy, are also considered to be valuable means to take the knowledge from the academic to the industrial.

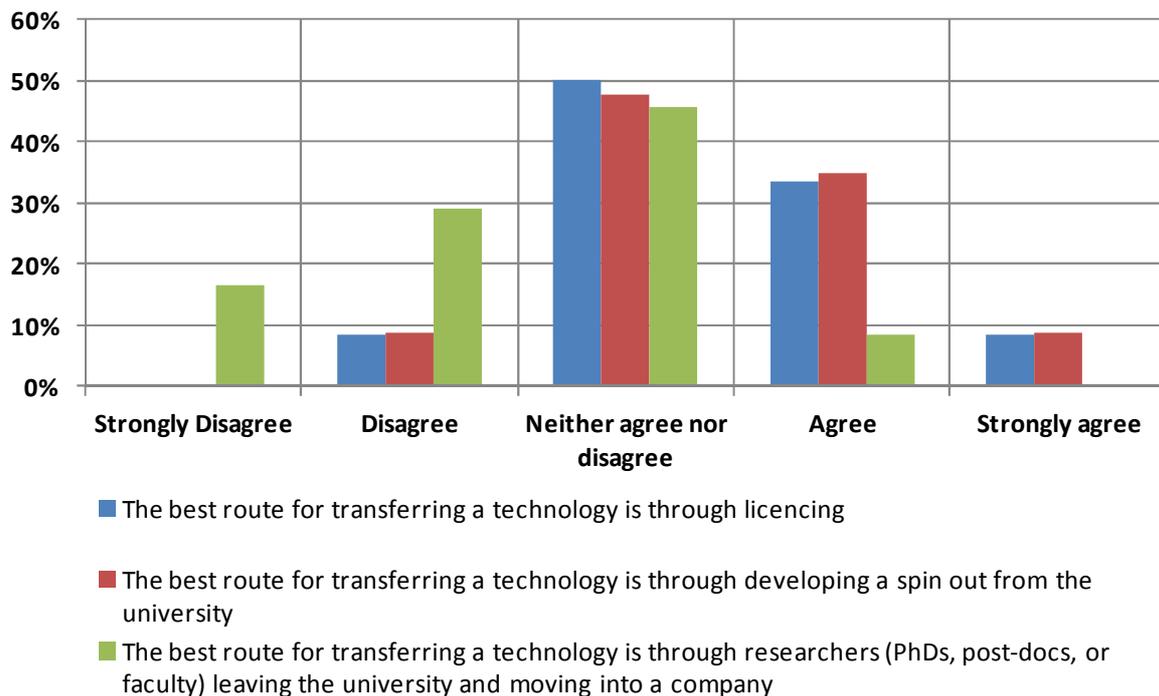


Figure 2 – opinions on best routes to transfer technology

The responses from the sample indicate that about half of our respondents do not wish to preference one route over another, indicating that they neither agree nor disagree that licencing, spin-outs or researchers are the best route for transferring a technology. However, while on average this sample is agreeing 7 licences per year and managing 14 research contracts this hides a skew as one-third of this sample are reporting no licences and two-thirds no consultancy contracts.

It is not possible from the survey data to see whether there are no opportunities for licencing or consultancy in these TTOs but it would be surprising if that were the case given the levels of disclosure at each office. This may reflect an in-built bias due to the structure of the offices and the effort to have mandatory patenting of all disclosures.

Many TTOs are weakly integrated and supported into their organisations

While the Innovation Law makes it mandatory for each university to have a TTO this does not automatically mean that all TTOs will be created equal. Most importantly the level of support for the TTO will vary depending on the scale and focus of each university.

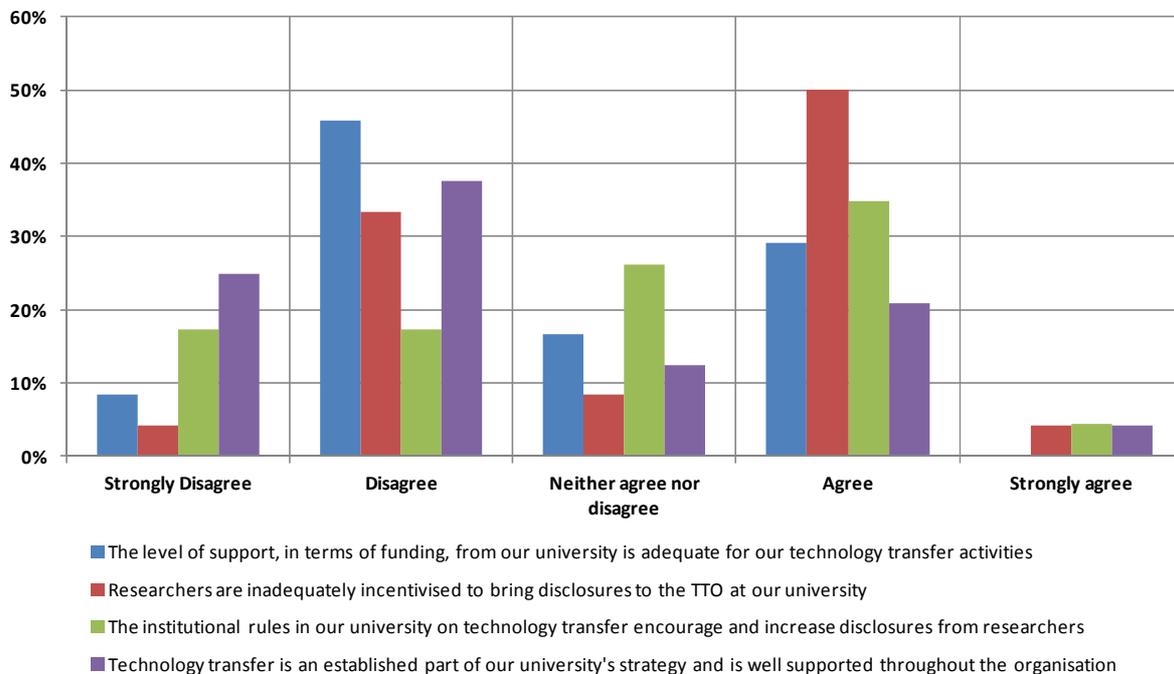


Figure 3 – opinions on levels of support for TTOs across Brazilian universities

As Figure 3 indicates there are very high levels of concern regarding how well integrated technology transfer and the TTOs are within their home organisations. Over half (54%) don't believe they have the necessary support and funding and nearly two-thirds (63%) do not believe that technology transfer is an established part of the university's strategy. This combined with a majority agreeing that researchers are inadequately incentivised to bring disclosures to the TTO paints a picture of the TTOs feeling marginalised and disconnected from the organisations they are trying to serve.

This level of perceived separation may be the reason that our respondents feel there are too few disclosures coming from the academics, although the level of agreement is very high (79%). Overall the TTOs opinion is that the quality of those disclosures is strong (62% agree) but it is slightly worrying that of those agreeing none chose 'strongly agree'. This is a potential weakness as there could be a bias towards positivity in terms of the host institution, but it does not translate into very strong support for the quality of the disclosures coming to the TTOs.

Perceived lack of demand for Brazilian research outputs

Even if the quality of research is very high across Brazilian universities and the TTOs are operating well, if there is no demand from domestic and international companies for that research it will be impossible to have commercialisation of any kind. The respondents in this sample are split with one-third believing there is good domestic interest and two-thirds thinking there is not (Figure 4).

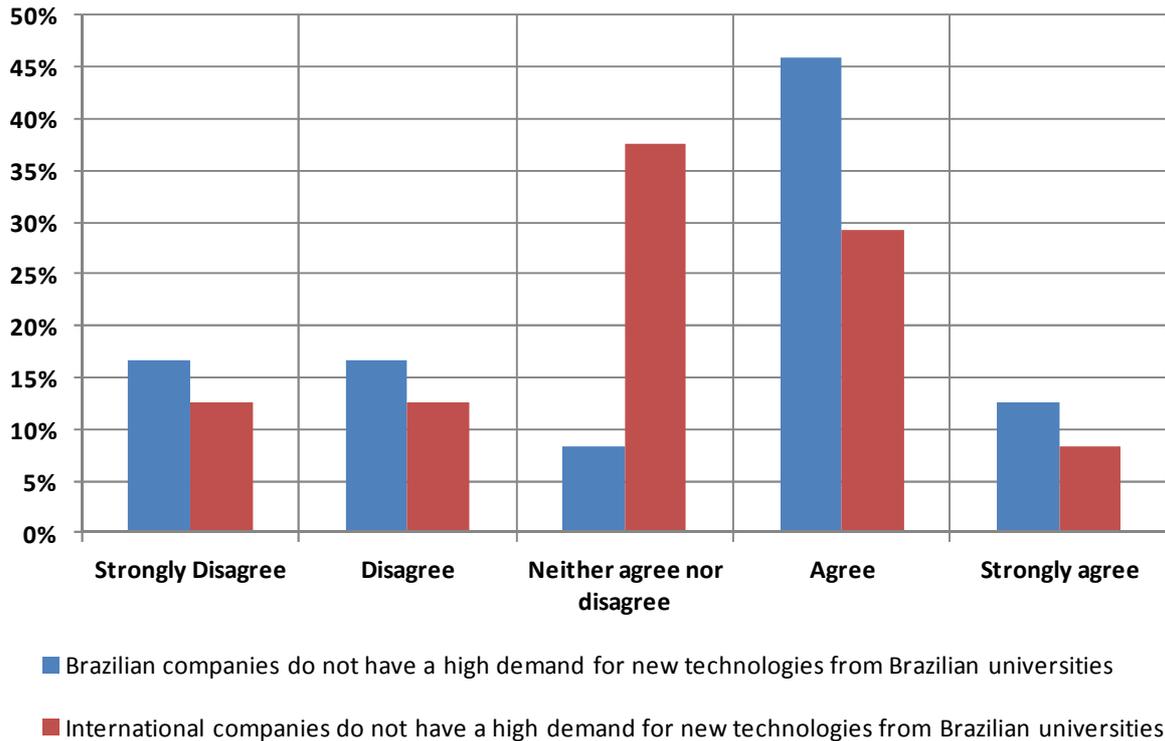


Figure 4 – opinions on demand for university technology from domestic and international firms

While the level of agreement that there is a lack of demand from international companies for the products of Brazilian research (38%) the percentage of respondents sitting on the fence is much higher in this case. The same number who think there is a lack of demand don't know either way. This probably indicates a number of TTOs who have not had any significant contact with international companies, either because of their scale or due to a lack of international experience.

Overall these responses are a concern as even if the various issues that TTOs face internally are fixed, if there is a lack of demand for technologies produced by Brazilian universities it will be very difficult to make the link between investment in fundamental research and economic growth in the long run.

Weak links to follow on financing

Aside from the demand from existing companies as discussed above another route to transfer technology is to develop spin-outs from universities that can take the technologies forward. Key to being able to manage this strategy is access to finance, especially finance for scale up from the lab to prototypes and beyond.

There is a striking weakness in the level of formal and informal links from the TTOs to incubators, venture capital companies and angel investors (Figure 5).

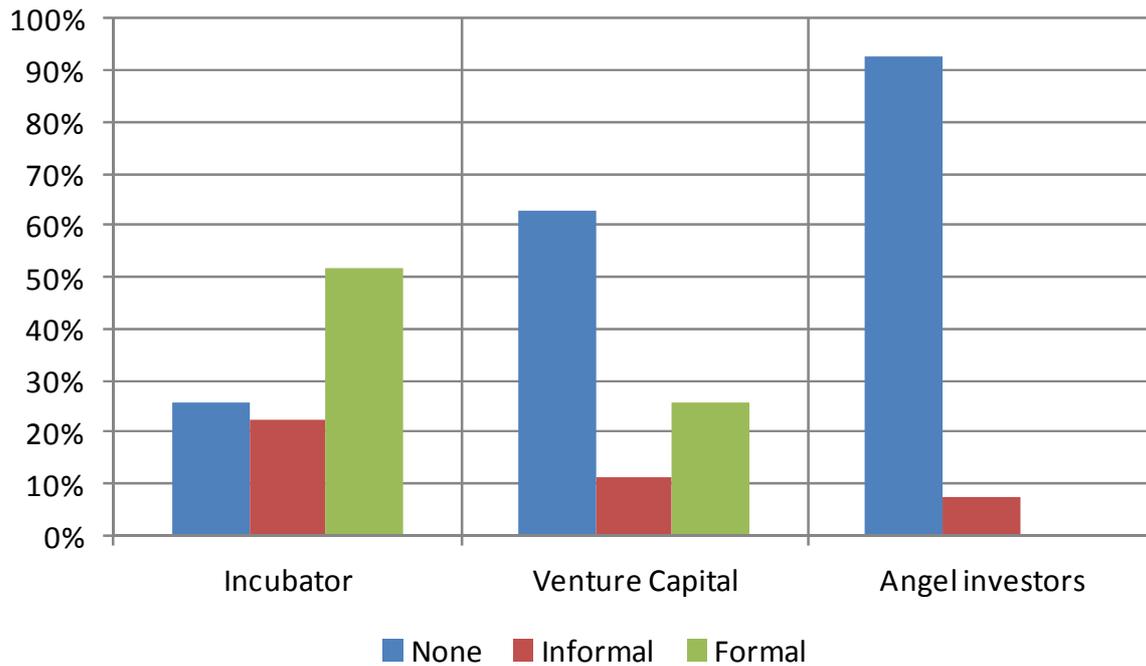


Figure 5 – percentage of TTOs with links to incubators, VCs and angel investors

Half of our sample do have some formal links to incubators, but only 26% have formal links to venture capital companies and there are no formal links to angel investors. Even accounting for informal links to both venture capital companies and angel investors, it appears that over two-thirds of the TTOs who responded to the survey have no links at all to follow on funding.

Without access to finance to grow new companies, so that they can either scale or be purchased, the option to use spin-outs to foster technology transfer is fundamentally blocked. Whether this lack of access is due to a weak culture of angel investing in Brazil and a lack of venture capital funding is unclear³, but this must be a focus within the institutional framework of Brazilian innovation if there is to be alternatives to commercialisation beyond simply patenting and licencing.

TTOs may not have the necessary commercial and technical skills

Managing the process of technology transfer requires a broad set of skills ranging from technical depth to be able to assess and assist academics through the disclosure process, the necessary legal knowledge to manage patenting and licencing, and also commercial knowledge to interact effectively with industry and to help spin-outs with their development. Many TTOs are very small in Brazil and the average response in this sample describes a TTO with seven staff, two of whom have advanced degrees and one of whom is an intellectual property specialist.

When asked whether they agreed they had the necessary technical, legal and commercial skills to manage the technology transfer process each element had a very different profile (Figure 6). A

³ A recent MIT Sloan student project attempted to map the extent of the Brazilian venture capital market through interviews and secondary research. Their findings point to the venture capital industry being at a very early stage of development. Their report is online at <http://mitbrazilventurecapitalstudy.files.wordpress.com/2013/03/mit-brazil-vc-study-2012-2013.pdf>.

majority of TTOs feel they have the legal skills required (54%) and just under one-third disagree (29%). The next strongest area is the technical skills base of the TTOs with just under one-third (29%) believing they have to skills required compared to just under half (45%) who do not. The largest deficit is in commercial skills as only 13% of our respondents believe they have the necessary skills in this area to be effective.

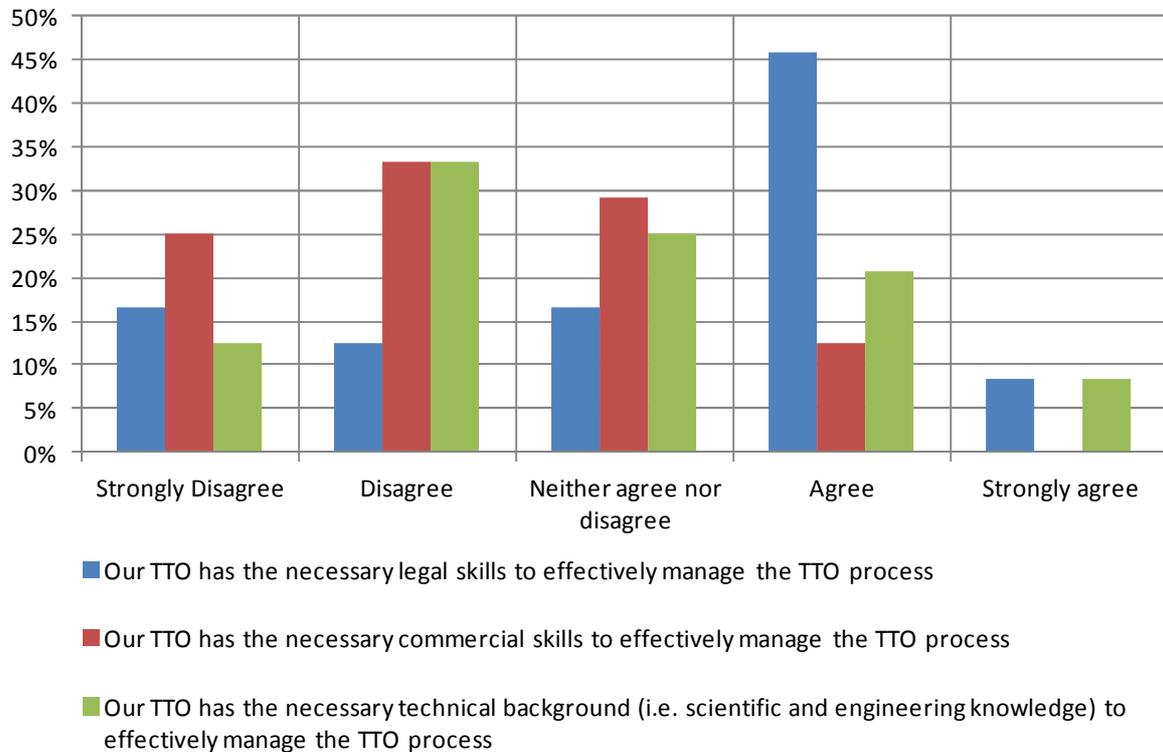


Figure 6 – TTO perceptions of their skills profile

These responses may reflect the size distribution of TTOs in Brazil but they are a significant concern nonetheless as they reflect a worry on the part of the TTOs themselves that they cannot manage the technology process effectively beyond patenting and possibly licencing.

Does the Innovation Law need to be improved?

A key change in the institutional framework for innovation and more specifically technology transfer was the introduction of the Innovation Law in 2004. A significant period of time has passed since the introduction of the law and as part of the survey we simply asked respondents whether the Innovation Law needed to be improved. We did not qualify the question into specific changes as that would have been too complicated a question to ask through this kind of survey.

The specific wording of the statement which respondents were asked to agree or disagree with was “The current structure of national law regarding technology transfer (Innovation Law in 2004) works well and does not need to change”. Three quarters (75%) of the sample disagreed with this statement indicating a large body of professionals working within technology transfer who do not believe the current legal framework is working effectively.

Regional variations in responses

Given the variations in economic strength across a country as large and diverse as Brazil it is important to acknowledge where there are regional differences in the responses to these questions. This section highlights those questions where there were differences in response broken down by major region for the North East, South and South East. The Middle West and North had too few responses to be included in the breakdown (less than five TTOs responding).

Region	Percent
Middle WE	10%
North	3%
Northeast	21%
South	31%
Southeast	34%

Table 1 – percentage of respondents by region

The analysis in this section should be taken as indicative due to the low number of respondents once the results are broken into regions. The full table of results broken down for the North East, South and South East are given in appendix 3.

Links to other organisations

The links between the TTOs and incubators is similar except that all of the links in the North East are marked as formal, whereas those in the South and South East are split between informal and formal linkages. The lack of linkages to angel investors is the same across the regions but the links to venture capital does show some variation (Figure 7).

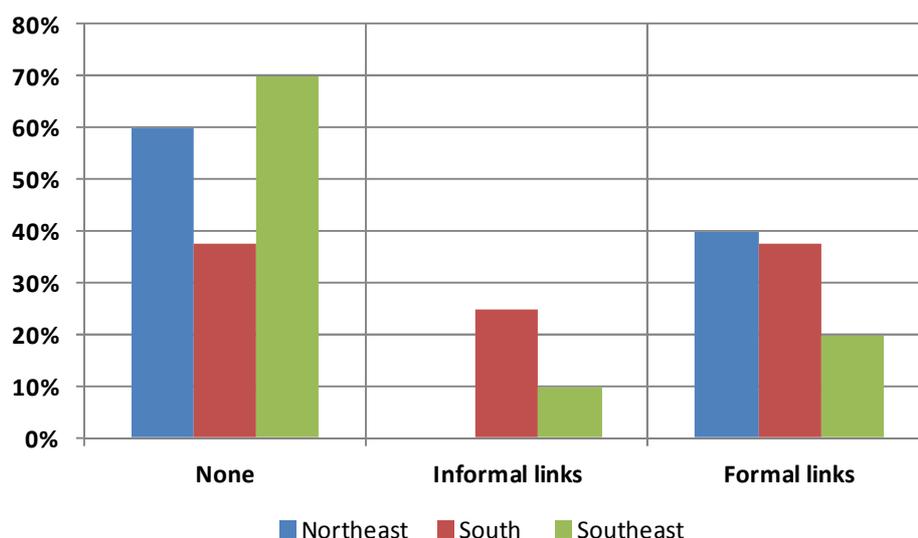


Figure 7 – links to venture capital by region

The density of reported links from TTOs to venture capital is higher in the South dependent on informal links.

Researcher incentives and disclosures

The North East and South have a similar level of agreement that the level of disclosures are too low (80%, 75%) which is much higher than that of the South East (50%), whereas there is broad agreement that the quality of disclosures is high.

However, there is a significant difference in opinion on whether researchers are adequately incentivised to bring disclosures to TTOs. The TTOs in the North East and the South agree that there are inadequate incentives (80%, 75%) which is the reverse of the position for South East TTOs, where only 10% believe there are inadequate incentives for researchers.

Routes to commercialisation

The three routes presented to the TTOs were through licencing, via spin-outs and through the movement of researchers into the private sector. There are two main points of divergence in the regional responses to which route is the best for transferring a technology. The North East and South East TTOs weakly agree that spin outs are the best route (20%, 30%) whereas half of the South TTOs agree that spin-outs are the best way to transfer a technology. This is interesting as the South is also the region with the largest number of links to venture capital (either informal or formal).

The second major difference is in attitudes to the transfer of technology via people. The strength of disagreement to the importance of people in the process is high in the South East and South (50%, 40%) but is much lower in the North East (20%). The majority of difference falls into the intermediate category of neither agree nor disagree, but the difference in strength is important if this pathway is to be promoted in each of the regions.

It should also be noted that each of the regions had a very different level of support for patents as being critical to their work. While only 20% of North East TTOs agree, 50% of South East and 75% of South TTOs agree that patents are critical to technology transfer. Again the narrative and process of technology transfer appears to be interpreted quite differently region to region.

Levels of institutional support

TTOs across all three regions feel a similar lack of support, especially in terms of funding, from their home institutions with roughly 40% disagreeing that the support is adequate for their work. However in terms of inclusion in their university's strategy and understanding across the organisation TTOs in the South East were most positive (40% agree) and those in the North East most negative (none agreed). It appears that the level of dissatisfaction with funding for the TTOs is at a similar level across the regions but that the level of embedding is weakest in the North East.

Skills required to manage the technology transfer process

How confident the TTO is that it has the necessary skills to manage the technology transfer process does seem to be dependent on the region in which the TTO is situated. The North East has the weakest response, with only 20% believing they have the necessary legal and commercial skills and none of the North Eastern respondents believing that they have the necessary technical skills. In contrast the South East is much more confident that they have the legal skills (60% agree) but this

region has the lowest agreement score on commercial skills (10%) and is second on technical skills with only 20% agreeing that they did have the necessary technical skills (Figure 8).

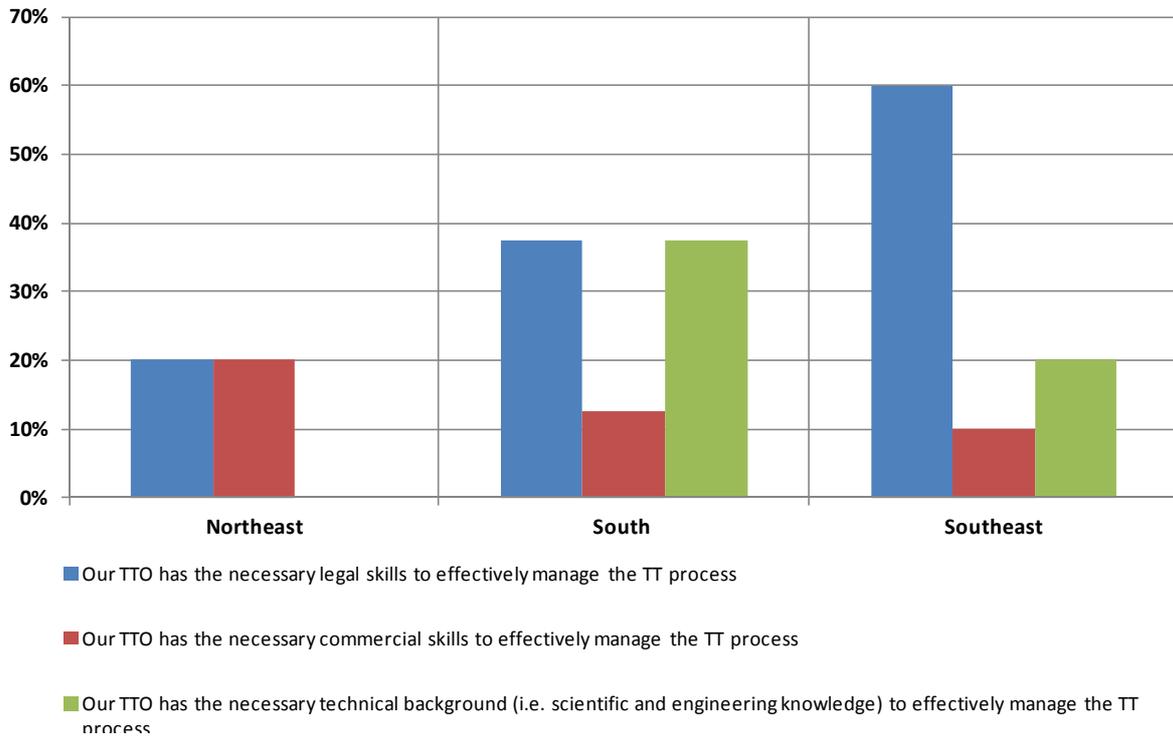


Figure 8 – percentage of TTOs by region agreeing with each skills statement

Summary of regional differences in agreement to attitudinal questions

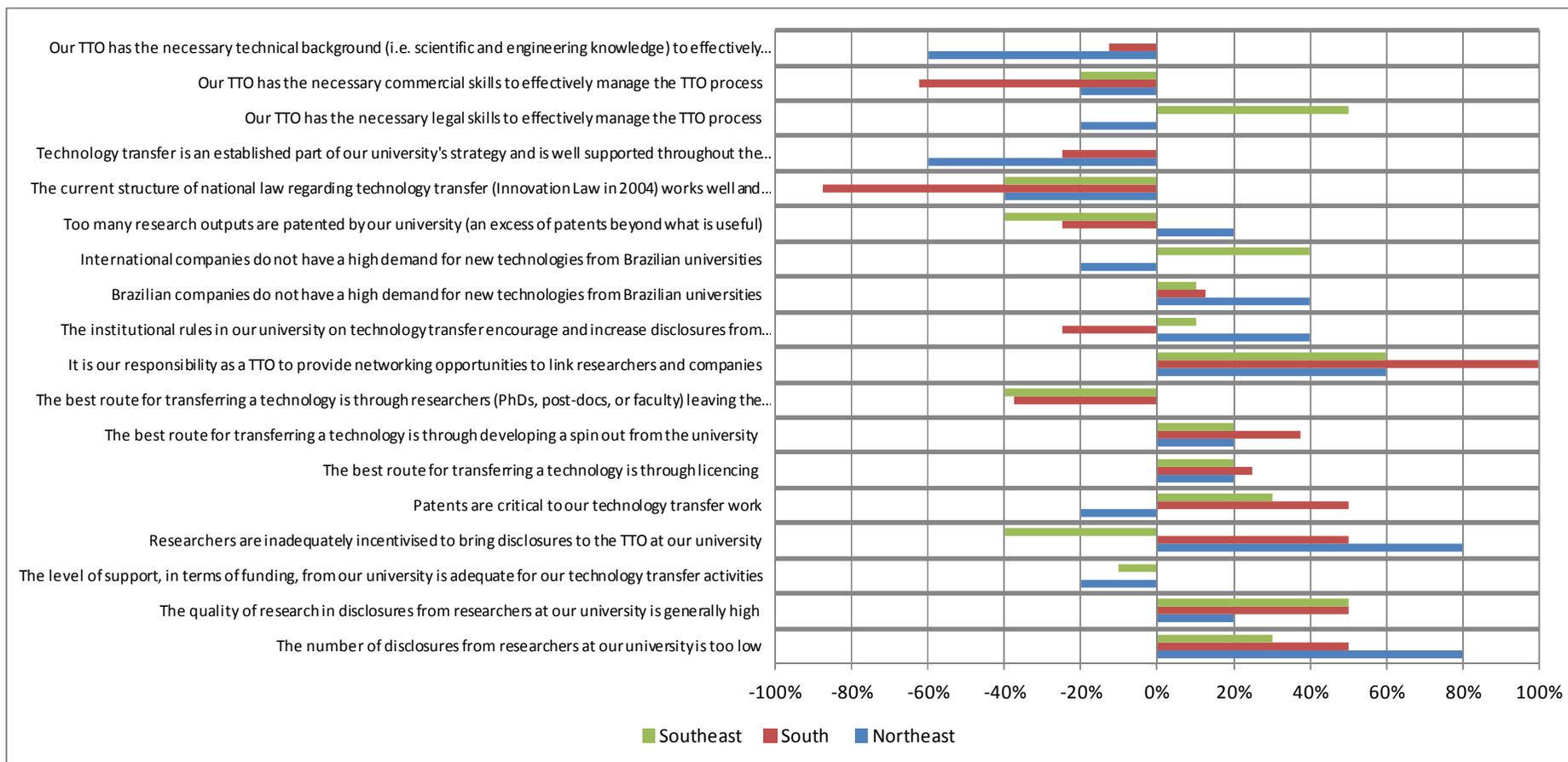


Figure 9 – percentage agreeing minus percentage disagreeing by region and question

Discussion

There has been significant research on the practice of technology transfer around the world with a number of highly cited reviews (for example (Bozeman 2000; Perkmann, Tartari et al. 2013)) and even a journal dedicated to the subject (the *Journal of Technology Transfer* which was founded in 1977). This high level of research and scrutiny is due to the interest in seeing the results of research make the transition into use in one form or another and because there is a desire to close the loop on the investment in research and development with a return to the individual, the university and the country.

However, research on technology transfer is highly skewed towards countries such as the United States which has a well developed set of institutions involved in this activity and a long history of legislative action (most specifically the Bayh-Dole act of 1980).⁴ This lack of contextualised research across emerging economies is a problem, as the lessons of technology transfer that have been learnt in one context may or may not be applicable to another. This survey is a first step to have a clearer picture of the attitudes and perceptions of the professionals working in TTOs across Brazil and it is hoped that it can act as a spur to more extended work in this fashion to track how these attitudes change and to help improve the outcomes for TTOs and the country.

This survey is different from the majority of surveys in the area of technology transfer, as it goes beyond a process model of technology transfer and attempts to understand how TTOs view their world. Because of this the results cannot be compared to international benchmarks at present. It is hoped that this team will be able to carry out similar surveys in the UK in the near future and the outputs of such work would be important to contrast to this initial work in Brazil.

A number of themes appear across the individual results which deserve some attention. The first is how the purpose of technology transfer is defined by the various actors involved (government, universities, industry) and how these interact in the operation and outcomes of the TTOs. Technology transfer can be thought of in many ways - as a means to support economic growth, for providing revenue to universities or as a means to address national goals (such as in healthcare or development). This survey did not address this issue directly but it is important that each office understands the assumptions under which they are operating.

This is especially important when it comes to the issue of how TTOs are funded. Whether each TTO will be able to break even, let alone return any funds to the university, has been a contentious issue in developed economies such as the United States and the United Kingdom. For many years there was a belief that many of the technology transfer offices in the United States were well above the breakeven point. However, this does not appear to be the case. According to Abrams et al (2009) in their survey of US based technology transfer offices "... only 16% are self-sustaining, bringing in enough income that, after distributions to inventors and for research, there are sufficient funds to cover the operating costs of the program."

⁴ A search of Science Direct for articles with 'technology transfer' in their titles returns 858 articles. Within this set of articles only 10 mention Brazil in any form in the title, abstract or keywords.

The second theme is again definitional but it is important as it sets boundaries on how each TTO will operate. For many technology transfer has been reduced to patenting and licencing, which ignores other activities which can also play a part in taking technologies from universities to industry. Broadening the discussion on technology transfer from licencing to including developing spin-outs, the movement of trained researchers and the provision of consultancy and contract research is necessary to ensure TTOs have the flexibility to achieve their goals.

The third issue that the survey raises is the legal and institutional structure in which technology transfer occurs in Brazil. The survey included one high level question on the Innovation Law, as we did not have time and space to include more detailed questions, but it had a very clear and negative response. If the opinion expressed by this sample of TTOs were to be replicated across the country this would indicate a significant issue with the legislative structures intended to support innovation and the relationship between universities and industry. A further investigation on the detailed elements of the Innovation Law may be warranted.

It is hoped that the survey and this report provide a useful contribution to the ongoing debates on how to raise innovation rates and to improve economic growth in Brazil based on the activities and outputs of the university sector. This is a preliminary survey which provides an outline of the attitudes of TTOs across the country. Our hope is that work such of this can be repeated in the coming years and a clearer and deeper picture of how TTOs view the world can be developed.

Appendix 1 – survey questionnaire

BACKGROUND INFORMATION
What is the name of your organisation?
If affiliated to a university please indicate which university (your parent or host organisation)
Approximately how many faculty does your university have?
In what year was the TTO established?
Number of staff in the TTO?
Please indicate the level of funding support you received from your parent institution in the past financial year
How many of your current staff hold advanced degrees (Masters level or above)?
How many of your current staff are specialists in managing intellectual property?
What was the rate of staff turnover for your TTO in the past year?
ECOSYSTEM LINKS
Do you have a link to an incubator where spin-outs/start ups from the university can develop?
Do you have links to venture capital companies or groups?
Do you have links to angel investors?
Do you have links to other TTOs in Brazil?
How many networking events did you hold in the past year to bring together researchers and companies?
TECHNOLOGY TRANSFER ACTIVITIES
What was your budget for the past year for patenting activities?
What was your budget for the past year for licencing activities?
How many disclosures did researchers bring to the TTO in the past year?
Of these disclosures how many were considered appropriate to take forward to patent?
How many patents did your TTO apply for this past year at the national level?
How many patents did your TTO apply for this past year at the international level (PCT)?
How many licences did your TTO agree in the past year?
How many research contracts passed through the TTO in the past year?
What was the total value of these research contracts?
How many consultancy agreements did the TTO assist in arrangnig for researchers in the past year?
What was the total value of these consultancy agreements?
What percentage of income from licencing is given to researchers involved in a licence?

LINKS TO INDUSTRY

How many requests for access or information did the TTO receive from Brazilian companies in the past year?

How many requests for access or information did the TTO receive from international companies or their Brazilian subsidiaries in the past year?

What percentage of all licences were carried out with international companies or their Brazilian subsidiaries in the past year?

What percentage of all consultancy agreements were carried out with international companies or their Brazilian subsidiaries in the past year?

What percentage of all collaborative research was carried out with international companies or their Brazilian subsidiaries in the past year?

ATTITUDINAL QUESTIONS

The number of disclosures from researchers at our university is too low

The quality of research in disclosures from researchers at our university is generally high

The level of support, in terms of funding, from our university is adequate for our technology transfer activities

Researchers are inadequately incentivised to bring disclosures to the TTO at our university

Patents are critical to our technology transfer work

The best route for transferring a technology is through licencing

The best route for transferring a technology is through developing a spin out from the university

The best route for transferring a technology is through researchers (PhDs, post-docs, or faculty) leaving the university and moving into a company

It is our responsibility as a TTO to provide networking opportunities to link researchers and companies

The institutional rules in our university on technology transfer encourage and increase disclosures from researchers

Brazilian companies do not have a high demand for new technologies from Brazilian universities

International companies do not have a high demand for new technologies from Brazilian universities

Too many research outputs are patented by our university (an excess of patents beyond what is useful)

The current structure of national law regarding technology transfer (Innovation Law in 2004) works well and does not need to change

ATTITUDINAL QUESTIONS

Technology transfer is an established part of our university's strategy and is well supported throughout the organisation

Our TTO has the necessary legal skills to effectively manage the TTO process

Our TTO has the necessary commercial skills to effectively manage the TTO process

Our TTO has the necessary technical background (i.e. scientific and engineering knowledge) to effectively manage the TTO process

Appendix 2 – Summary survey results (attitudinal)

	Strongly Disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
The number of disclosures from researchers at our university is too low	4.2%	12.5%	4.2%	41.7%	37.5%
The quality of research in disclosures from researchers at our university is generally high	8.3%	4.2%	25.0%	62.5%	0.0%
The level of support, in terms of funding, from our university is adequate for our technology transfer activities	8.3%	45.8%	16.7%	29.2%	0.0%
Researchers are inadequately incentivised to bring disclosures to the TTO at our university	4.2%	33.3%	8.3%	50.0%	4.2%
Patents are critical to our technology transfer work	0.0%	25.0%	8.3%	20.8%	45.8%
The best route for transferring a technology is through licencing	0.0%	8.3%	50.0%	33.3%	8.3%
The best route for transferring a technology is through developing a spin out from the university	0.0%	8.7%	47.8%	34.8%	8.7%
The best route for transferring a technology is through researchers (PhDs, post-docs, or faculty) leaving the university and moving into a company	16.7%	29.2%	45.8%	8.3%	0.0%
It is our responsibility as a TTO to provide networking opportunities to link researchers and companies	8.3%	0.0%	4.2%	16.7%	70.8%
The institutional rules in our university on technology transfer encourage and increase disclosures from researchers	17.4%	17.4%	26.1%	34.8%	4.3%
Brazilian companies do not have a high demand for new technologies from Brazilian universities	16.7%	16.7%	8.3%	45.8%	12.5%
International companies do not have a high demand for new technologies from Brazilian universities	12.5%	12.5%	37.5%	29.2%	8.3%
Too many research outputs are patented by our university (an excess of patents beyond what is useful)	25.0%	37.5%	12.5%	16.7%	8.3%
The current structure of national law regarding technology transfer (Innovation Law in 2004) works well and does not need to change	33.3%	41.7%	16.7%	8.3%	0.0%
Technology transfer is an established part of our university's strategy and is well supported throughout the organisation	25.0%	37.5%	12.5%	20.8%	4.2%
Our TTO has the necessary legal skills to effectively manage the TTO process	16.7%	12.5%	16.7%	45.8%	8.3%
Our TTO has the necessary commercial skills to effectively manage the TTO process	25.0%	33.3%	29.2%	12.5%	0.0%
Our TTO has the necessary technical background (i.e. scientific and engineering knowledge) to effectively manage the TTO process	12.5%	33.3%	25.0%	20.8%	8.3%

Appendix 3 – Regional breakdown of attitudinal responses

		Northeast	South	Southeast
The number of disclosures from researchers at our university is too low	Strongly disagree + Disagree	0%	25%	20%
	Agree + Strongly agree	80%	75%	50%
The quality of research in disclosures from researchers at our university is generally high	Strongly disagree + Disagree	20%	13%	0%
	Agree + Strongly agree	40%	63%	50%
The level of support, in terms of funding, from our university is adequate for our technology transfer activities	Strongly disagree + Disagree	40%	38%	40%
	Agree + Strongly agree	20%	38%	30%
Researchers are inadequately incentivised to bring disclosures to the TTO at our university	Strongly disagree + Disagree	0%	25%	50%
	Agree + Strongly agree	80%	75%	10%
Patents are critical to our technology transfer work	Strongly disagree + Disagree	40%	25%	20%
	Agree + Strongly agree	20%	75%	50%
The best route for transferring a technology is through licencing	Strongly disagree + Disagree	0%	13%	10%
	Agree + Strongly agree	20%	38%	30%
The best route for transferring a technology is through developing a spin out from the university	Strongly disagree + Disagree	0%	13%	10%
	Agree + Strongly agree	20%	50%	30%
The best route for transferring a technology is through researchers (PhDs, post-docs, or faculty) leaving the university and moving into a company	Strongly disagree + Disagree	20%	50%	40%
	Agree + Strongly agree	20%	13%	0%
It is our responsibility as a TTO to provide networking opportunities to link researchers and companies	Strongly disagree + Disagree	0%	0%	10%
	Agree + Strongly agree	60%	100%	70%
The institutional rules in our university on technology transfer encourage and increase disclosures from researchers	Strongly disagree + Disagree	0%	38%	30%
	Agree + Strongly agree	40%	13%	40%
Brazilian companies do not have a high demand for new technologies from Brazilian universities	Strongly disagree + Disagree	20%	38%	30%
	Agree + Strongly agree	60%	50%	40%
International companies do not have a high demand for new technologies from Brazilian universities	Strongly disagree + Disagree	40%	25%	10%
	Agree + Strongly agree	20%	25%	50%
Too many research outputs are patented by our university (an excess of patents beyond what is useful)	Strongly disagree + Disagree	20%	50%	60%
	Agree + Strongly agree	40%	25%	20%
The current structure of national law regarding technology transfer (Innovation Law in 2004) works well and does not need to change	Strongly disagree + Disagree	60%	88%	50%
	Agree + Strongly agree	20%	0%	10%
Technology transfer is an established part of our university's strategy and is well supported throughout the organisation	Strongly disagree + Disagree	60%	50%	40%
	Agree + Strongly agree	0%	25%	40%
Our TTO has the necessary legal skills to effectively manage the TTO process	Strongly disagree + Disagree	40%	38%	10%
	Agree + Strongly agree	20%	38%	60%
Our TTO has the necessary commercial skills to effectively manage the TTO process	Strongly disagree + Disagree	40%	75%	30%
	Agree + Strongly agree	20%	13%	10%
Our TTO has the necessary technical background (i.e. scientific and engineering knowledge) to effectively manage the TTO process	Strongly disagree + Disagree	60%	50%	20%
	Agree + Strongly agree	0%	38%	20%

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