

Incubation Strategies for Spinning-Off New Technology Ventures in Catalonia: The Case of the University of Girona

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1. PROBLEM STATEMENT

University-based scientific inventions that translate into spin-off companies represent a potentially important and increasingly utilised option to create wealth from the commercialisation of research (Carayannis, 1998; Clarysse et al., 2005; Lockett et al., 2005; Siegel et al., 2003; Vohora et al., 2004). The conventional route to transfer knowledge from university to market has been generally through two means: 1) licensing the rights to use technological discoveries controlled by university owned patents (Intellectual Property-IP) and 2) contract research. In recent years, university spin-off companies have become an increasingly popular way of exploiting potentially valuable research and knowledge; however, understanding this phenomenon remains limited.

This research is motivated by the need to learn more about university start-up companies and particularly those created on the basis of technology developed in universities. We adopt a multi-dimensional approach to study the incubation strategy for spinning-off companies of the University of Girona (Catalonia–Spain). We analyse the strategy of these Public Research Institution (PRI) in terms of resources and activities, how the process of spinning-off ventures is organised and if the outputs fit with this PRI's objectives and the local environment.

This multi-dimensional dynamic approach involves two main different levels of analysis: the local environment at the PRI and the PRI with particular emphasis on the Technological Trampoline (a unit within the Technology Transfer Office in charge of new venture creation) and a secondary one, the spin-off. To guide our research we draw upon three streams of literature that contribute to the understanding of spin-off creation and support at PRIs.

This paper attempts to answer the following questions:

- What is the regional environment for spin-offs emerging from PRI in Girona (Spain)?
- How does the actual model of technology transfer employed by the TT of the University of Girona work and how has it evolved since its foundation?
- Which is the predominant incubation model of managing the spin-off process at the University of Girona?

2. LITERATURE REVIEW AND THEORETICAL FRAMEWORK

First, we make a brief note on the definition of spin-offs due to the complexity and multiple facets of this phenomenon. Then, we draw on the literature related to the resource-based view (RVB) of the firm literature. Next, we review institutional theory. Finally, we draw on the taxonomy of incubation strategies identified by Clarysse et al. (2005) within the European Institutions.

We adopt the definition of university spin-off provided by Pirnay et al. (2003:356) and supported by the majority of the scholars: “new firms created to exploit commercially some knowledge, technology or research results developed within a university”. However, we expand this definition taking Nicolau and Birley's (2003:340) definition that stresses that the founding member(s) may include the inventor academic(s) who may or may not be currently affiliated with the academic institution.

2.1. Resource-Based View

A number of researchers have utilised the resource-based view and the resource-based dependence view to analyse issues related to the emergence of spin-off and the resources as a differentiator and a predictor of competitive advantage (e.g. Clarysse et al., 2005; Druilhe and Garnsey, 2004; Pirnay et al., 2003; Shane and Stuart, 2002; Wright et al., 2004). We reviewed the main studies related to the process of spinning-off ventures within PRI that have applied resource-based view and resource-based dependence view. We have identified the main resources analysed and classified them in six broad categories: organisational, social, financial, technological, physical and human resources.

2.2. Institutional Theory

Recent work on the heterogeneity of research-based spin-offs (Mustar et al., 2006) describes the institutional perspective of spin-offs as the relationship and the embeddedness with their parent organisation, which has its own culture, incentive system, rules and procedures. All these elements constitute the structure that needs to be embedded in a supportive context. This context is related to the institutional and policy environment, the culture and the history that has unfolded within the academic institution (Debackere and Veugelers, 2005). We have reviewed the main studies related to the process of spinning-off ventures within PRI that have applied institutional theory and we have identified a set of formal and informal factors.

2.3. Taxonomy of Incubation Strategies

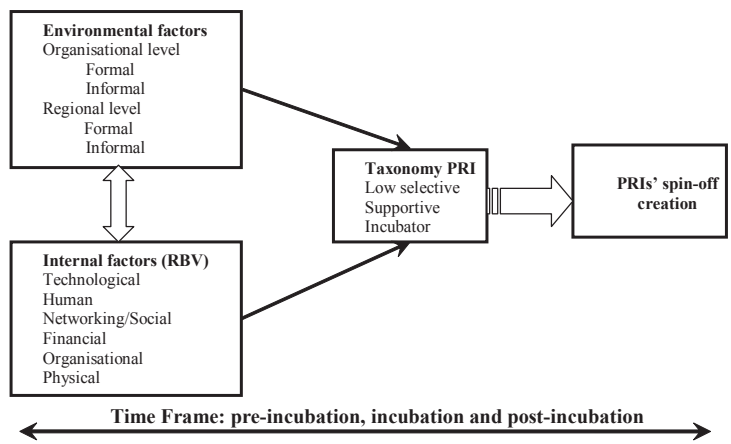
There are very few studies trying to shed light on the different existing taxonomies of European Research Institutions according to their objectives, strategies, resources and activities undertaken. After reviewing the scarce literature on this topic, Clarysse et al. (2005) offered a good comparative framework of taxonomies detected within European Institutions to map the activities, resources and activities undertaken. Based in an in-depth analysis of the seven cases from 13 European regions, Clarysse et al. (2005) identified three distinct incubation models of managing the spin-off process: Low Selective, Supportive, and Incubator.

Considering the previous arguments, we have built a model that combines the theoretical frameworks reviewed to give answer to our research questions. Figure 1 shows this model.

The first category refers to the environment and reflects the institutional view. The concepts included are institutional level factors - like strategy, technology transfer, links after start-up, parent features - and regional level factors - such as role models, social norms and entrepreneurial region.

Internal factors, drawn from the resource-based view of the firm, include all resources needed and provided by the PRI during the process of the new venture creation. We group these resources by the following categories: technological, human, networking, financial, organisational and physical.

Figure 1. Model of spin-off creation in PRIs



3. RESEARCH DESIGN

A two-stage methodology is employed. First, a qualitative approach was used to identify the strategy of the UdG’s Technological Trampoline in terms of resources and activities and how the process of spinning-off ventures is organised. In this stage, several methods of data collection were used to address these issues, enabling to cross-check results. Finally, we pattern matched our findings with Clarysse et. al. (2005) typologies with the aim of classifying UdG’s incubation strategies in the context of European research institutions and we also analysed

its fit with the environment.

In performing this study, we followed procedures commonly recommended for conducting case study research (Eisenhardt, 1989; Yin, 1989). Data collection was performed at different levels and using a mix of techniques, avoiding common method bias. Our multi-dimensional dynamic approach involves: the local environment at the PRI, the PRI with particular emphasis on the Technological Trampoline and the spin-offs that emerged from the TT since its foundation in 2001.

We examined the organisation of incubation spin-off services from the perspective of the parent institute. This entailed looking at two interrelated levels: the internal activities geared towards spinning-off companies and the context in which resources are employed. At this stage, in order to track, analyse and identify resources, activities and changes over the time a history approach was necessary. Herein, the tracing of historic PRI documents (e.g. plans, contracts, etc.) was central and complemented with extensive interviews about the PRI’s history and current operations. Thus, we carried out semi-structured interviews with representatives of the TT. Concretely, we interviewed the former and the current head of the TT and the two present business development assistants.

We also interviewed representatives of the spin-offs that emerged from the TT at UdG, focusing on the start-ups history and resource acquisition. Since the foundation of UdG’s TT, ten companies have been created and we focused on

understanding better the dynamics of venture formation and development as it is embedded in this particular PRI.

4. DISCUSSION

Due to space limitations, we do not provide the discussion of the findings because we consider more important to focus on: conclusions, implications, recommendations, future research and limitations. We would only contextualise our main unit of analysis: the Technological Trampoline.

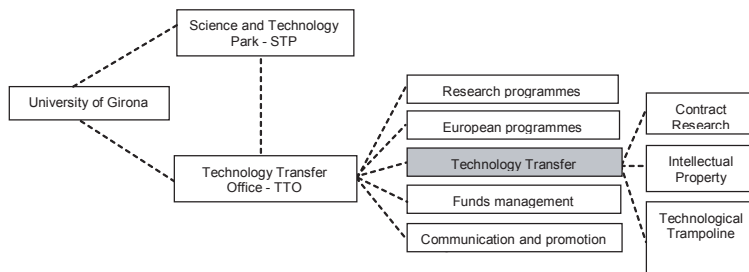
The Technological Trampoline (TT) is a public independent entity integrated in the Technology Transfer Office (TTO)¹ and responsible for promoting technology and knowledge exchange basically through spin-off creation. Although the TT is linked to the TTO in terms of office spaces and other physical resources, its functioning and budget are independent from both the University and the TTO.

5. CONCLUSIONS

The findings highlight that the region of Catalonia is highly entrepreneurial in Spain, but still far from other European scientific regions of excellence like Baden-Württemberg or Ile-de-France (Clarysse et al., 2005). At the university level, the commercialisation of research happens similarly to the one described in Debackere and Veugelers (2005), but having different magnitudes. The regional environment clearly impacts on the resource acquisition process of the TT and its spin-offs. Concretely, the regional government is financially supporting this unit and at the same time is creating a network of advisors, business angels, IP specialists and other resources and capabilities to help in the success of such companies. Still, support mechanisms mainly come from the regional level, rather than local (city council, chamber of commerce), national or international levels.

Similarly to Germany (Krücken, 2003), where either the regional government (Lander) or the National Ministry of Science and Research were the main driving forces of the TTOs’ institutionalisation process, the motivation of creating a

Figure 2. Main units of UdG’s science-based and technology transfer activity



spin-off support unit at UdG was twofold. On the one hand, a general interest of a limited group of people to follow the international trend, including transfer-oriented professors and technology transfer officers. On the other hand, the regional government's initiative to help universities create the adequate structures to facilitate the commercialisation of research via spin-off creation. By that time, the university and its managers were still in the "ivory tower". This resulted into a *laissez-faire* university policy, where the TT followed its own path towards developing and diversifying its activities and finding resources in order to continuously assist and support researchers to carry out their ideas. Lately, the TT in Girona has already gone through a consolidation stage where an institutionalisation of the unit and routinisation of its services has been achieved.

The elements of the three typologies of incubation strategies in European research institutions can be identified at the University of Girona. Nevertheless, the predominant typology at the UdG is the Supportive model. This model stems from the general idea of commercialising technology developed at the RI through other means than licensing or contract research. Hence, the spin-offs are an alternative option to create value from technology and their returns are based on economic profitability rather than financial gains for investors upon exit. Once the TT decides to commercialise technology through a spin-off, the team of researchers is intensively coached, including help with looking for money. However, in the beginning the TT had to create awareness, entrepreneurial culture and role models, thus the spin-offs created did not follow their selection criteria and initial objectives. Therefore, we still can observe a mixed model between Low Selective and Supportive. According to Clarysse et al. (2006:212) "...it is important for RIs to be very clear about their objectives and specify clearly the resources that are needed/activities performed to meet these objectives". The lack of clarity about the TT's objectives results in hybrid types that can be either resource or competence deficient. In fact, we have observed a hybrid model as a result of the continuous change in its objectives as a consequence of a learning-by-doing, try-and-error process and lack of sufficient competitive research.

Another problem identified at the UdG is its shortage of competitive research, which hinders any support to technology transfer activity. In fact, the UdG is only capable of spinning-off one or two technological companies per year, the rest may not be based on a differentiating/unique technology. Thus, the main point at the UdG lies on whether the applied model and the resources employed are worth used. In our opinion, it appears to be inappropriate to acquire the resources required to perform a Supportive model and then try to perform activities associated with a Low Selective model because their research outcomes are not sufficient.

6. IMPLICATIONS AND RECOMMENDATIONS

Our research suggests that the University of Girona should have a deeper pool of research with commercial potential. There is a need to first become a research university, with high quality of research (knowledge exploration and creation), and regional, national or international recognition. This can be stimulated through: 1) the recruitment, retaining, and development of star scientists; 2) partnership with leading industries in the region; 3) further investment and resources for research activities; and 4) a change in its incentive structure, especially for tenures.

Next, the process of cultural transformation aiming at converting the university into a more entrepreneurial should happen at different levels: teaching centres, including students and professors, administration and institution government. A major diffusion and a higher number of subjects on entrepreneurship and new venture creation are part of this transformation.

Third, although the TT followed a positive development path strongly guided by learning-by-doing that can be observed in both activities and resources, some recommendations are needed:

- A project selection methodology based on well-defined concepts and procedures is needed. Although the criteria and objectives regarding technology are very clear, the results are not completely successful. A clear methodology would automatically drive to resource savings and a better and more efficient allocation of them.
- Recruit more technology transfer officers with an appropriate private sector background and links with the local industrial districts in order to discover new opportunities, including experience of starting a business.
- At the university level, an incentive mechanism targeted at research groups and individual researchers should be designed by this embedded institution taking into account: academics profile, specific needs and regional industrial districts. Knowledge on existing practices in European research institutions

having a more advanced entrepreneurial culture might be a starting point when designing incentive structures and schemes for local academics willing to start a business.

- Although the decentralised organisation gives the TTO freedom of actuation by establishing their goals, mission and objectives, there are no monitoring mechanisms of the impact of their activities in the local environment. Despite spin-off companies are commonly used as a performance indicator, they should be a tool and not an aim when creating regional welfare.

Fourth, our analysis shows a high variety of institutions aiming to support and promote innovation in both enterprises and universities in the region. A frequent, regular and devoted process of continuous information about the existence and activities of such institutions and their initiatives (with special emphasis on national and European context) concerning spin-off creation and promotion could be a solution in enhancing the number of science-based entrepreneurial ventures.

7. LIMITATIONS AND FUTURE RESEARCH

First, examination of the broader technology-transfer strategies of the UdG and the research incentive structure was beyond the scope of this study. Further research should examine the rest of technology-transfer strategies and the balance of spin-offs versus other modes of technology transfer such as licensing and contract research. Second, our research does not deal with an in-depth analysis of the organisational or entrepreneurial culture within the PRI and the local environment. Third, the cultural transition of becoming entrepreneurial at both regional and university levels is a complex issue, and a more-detailed analysis based on historical, social and other criteria would make the analysis complete. Fourth, we do not show the results of the analysis aimed at characterising and analysing the success of the spin-offs created at this PRI. This is part of an undergoing research with the main objective of confronting both sides and show discrepancies if any in the model used by the TT and the expected results.

One main limitation and a primary future research field refers to the analysis and comparison of the resources, activities and success of the rest of PRI's incubation strategies in the same region (Catalan universities), then broadening the analysis to PRI's located in other regions within the Spain.

8. REFERENCES

- Carayannis, E.G.; Rogers, E.M.; Kurihara, K.; Allbritton, M.M. (1998) "High technology spin-offs from government R&D laboratories and research universities". *Technovation*, 18 (1), pp. 1-11.
- Clarysse, B.; Wright, M.; Lockett, A.; Van de Velde, A.; Vohora, A. (2005) "Spinning out new ventures: a typology of incubation strategies from European research institutions". *Journal of Business Venturing*, 20, 183-216.
- Debackere, K.; Veugelers, R. (2005) "The role of academic technology transfer organisations in improving industry science links", *Research Policy*, 34, 321-342.
- Druilhe, C.; Garnsey, E. (2004) "Do academic spin-outs differ and does it matter?". *Journal of Technology Transfer*, 29 (3-4), pp. 269-285.
- Eisenhardt, K.M. (1989) "Building Theories from Case Study Research". *Academy of Management Review*, 14, pp. 488-511.
- Hindle, K.; Yencken, J. (2004) "Public research commercialisation, entrepreneurship and new technology based firms: an integrated model". *Technovation*, 24, pp. 793-803
- Krücken, G. (2003) "Mission impossible? Institutional barriers to the diffusion of the 'third academic mission' at German universities". *International Journal of Technology Management*, 25 (1/2), pp. 18-33.
- Lockett, A.; Siegel, D.; Wright, M.; Ensley, M.D. (2005) "The creation of spin-offs at public research institutions: Managerial and policy implications". *Research Policy*, 34, pp. 981-993.
- Mustar, P.; Renault, M.; Colombo, M.G.; Piva, E.; Fontes, M.; Lockett, A.; Wright, M.; Clarysse, B.; Moray, N. (2006) "Conceptualising the heterogeneity of research-based spin-offs: A multi-dimensional taxonomy". *Research policy*, 35, pp. 289-308.
- Nicolaou, N.; Birley, S., (2003) "Academic networks in a trichotomous categorisation of university spinouts". *Journal of Business Venturing*, 18 (3), pp. 333-359.
- Pirmay, F.; Surlemont, B.; Nlemvo, F. (2003) "Toward a typology of university spin-offs". *Small Business Economics*, 21 (4), pp. 355-69.

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- Shane, S., Stuart, T., (2002) "Organisational endowments and the performance of university start-ups". *Management Science*, 48 (1), pp. 154-170.
- Siegel, D.S.; Waldman, D.; Link, A. (2003) "Assessing the impact of organisational practices on the relative productivity of university technology transfer offices: an exploratory study". *Research policy*, 32, pp. 27-48.
- Vohora, A.; Wright, M.; Lockett, A. (2004) "Critical junctures in the development of university high-tech spinout companies". *Research Policy*, 33, pp. 147-135.
- Wright, M., Vohora, A., Lockett, A., (2004) "The formation of high tech university spinout companies: the role of joint ventures and venture capital investors". *Journal of Technology Transfer*, 29 (3-4), pp. 287-310.

Yin, R.K. (1989) "Case study research-design and methods". Newbury Park: Sage Publications.

ENDNOTE

- ¹ The TTO provides administrative and supporting services relative to the different transfer modalities

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