

Academic Start Ups; The Sorbonne University Start Ups as a Model

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Received: 01/04/2024

Accepted: 26/06/2024

Published:30/06/2024

Abstract:

For universities, start-ups have become the symbol of a dynamic contribution to regional innovation and of the newest, most attractive and least predictable vanguard of their impact-oriented research. In a context of growing demand for innovation, the university finds itself in a new and challenging central position.

The introduction to the idea of academic start-ups in the form of projects will allow to obtain a better valuation, as well as a more mature and secure access to the business world.

Academic start-ups represent an important source of job and wealth creation. Today, the university must affirm its identity and its missions – those of research and training, it must also connect them to its social, economic and cultural environment.

Keywords: Start up, Academic start ups, French Tech, Spin Off, Academic start ups at the Sorbonne University.

Jel Classification Codes: I21, I23, I25, I26, I29

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1. INTRODUCTION

The Academic start-up, the main subject of our work, is now part of the daily vocabulary in many economic and social spheres. Development model for some, team management spirit for others, the word academic start-up is still widely used without having a uniform definition.

To undertake is first to commit a total commitment of the researcher or student, who must identify a need, put their skills to good use, invent and implement. If each of these steps is in itself a challenge, their sequence requires stubbornness. We cannot turn all university students into entrepreneurs or creators of academic start-ups, nor will we promote all our research in industrial form. It would be an aporia. On the other hand, the link between the university and economic circles is no longer a taboo today. Future generations reveal a much more uninhibited attitude on this subject.

2. Generalities about Star Ups

A startup: a company like any other? Not really. This term refers to a new innovative company with high potential for growth and speculation on its future value. But the start-up must first go through a phase of experimentation with its market and its economic model.

Literally meaning "start-up business", the startup is linked to the notion of experimenting with a new activity, on a new market, with a risk that is difficult to assess.

Steve Blank defines it as follows: a "temporary organization in search of a business model that can be industrialized is profitable and allows growth". (MelbourneUniversity, 2023)

There is therefore a fundamental difference between a company and a startup:

- The company optimizes a business model and derives maximum benefit from it to support its costs and remunerate its shareholders.
- The startup experiments with its business model and tests its market..

3. The Conditions to be a Startup

The startup carries with it the ambition to capture all the value of a market and to acquire a dominant position in it. Even if this is not always the intention of the creators at the start of the adventure, the startup sees big, sooner or later.

In summary, the startup is looking for a way to make its business profitable over the long term and above all to grow its revenues exponentially to reach the maturity of a large company. Whatever its sector of activity (digital, cleantech, biotech, edtech, fintech, collaborative economy, etc.), it is neither age nor size that makes a company a startup, but the 3 following conditions: (MelbourneUniversity, 2023)

- The prospect of strong growth.
- Use of new technology.
- The need for significant funding.

4. The Characteristics of the Start-up

The fundamental difference between an average company and a start-up is that a company is organized to execute and optimize a Business Model that works, while a young innovative company is organized to find one. (MelbourneUniversity, 2023)

The start-up makes it possible to quickly develop and increase a company in the market. Its objective is to create and build a solid and effective business model that can be taken up and improved by others. Thus, it offers a method of launching, managing and distributing a new kind of product or service to customers. The business model it adopts must be industrializable and feasible on a large scale.

Another distinctive characteristic compared to other companies is the use or design of new technologies. Most innovative companies operate in the digital, health, environment or biotechnology market.

The financing of a Star up is generally carried out via fundraising. Under certain conditions, this type of company can also benefit from aid (La Bourse French Tech, French tech ticket, etc.).

The start-up has different characteristics:

- **It is temporary**

The start-up status is scalable. This is not a goal in itself. This is a particular phase, aimed at transforming an idea into a stable company.

- **It presents an innovation**

This type of business consists of bringing value to customers through a completely new product or service. The challenge is to design a business model adapted to a given clientele.

- **It is industrializable / Reproducible**

The model designed must be feasible on a large scale, in other places, once it works (Airbnb, Uber).

- **It has exponential growth potential**

More the number of customers increases, the greater the margins. Thus, the company will

be able to grow very quickly and develop quite easily.

5. The Impact of University Startups

University startups have been around for a long time, but in recent years it has become easier for students and researchers to launch their own company. Facilitated by measures such as startup aid, entrepreneurship programmes, the dramatic reduction in the cost of information technology, and rapid prototyping have all motivated researchers to found startups. Students and researchers began to benefit from simple methods. In order to measure the impact of academic startups on the market, apart from the criterion of returns from patent licenses, the following questions must be answered: How important is university research outside academia? How many university startups outperform universities by impact-based metrics? Launch products and achieve profitability in the real world? Do. (MelbourneUniversity, 2023)

6. The Growth Factors of a Start-up

While the chronological order of a startup's development varies for each business, they share some common stages. Here's a list of the startup growth stages a business goes through:

- Pre-seed stage

In the pre-seed stage, a business is an idea or concept that has yet to be put into action. This is a development stage where individuals seek feedback from outsiders to gauge the possibility of making their ideas a reality. Here you research your target audience to see if they actually need your product or service. Consider whether there are already similar products in existence to see if there's potential competition and if so, identify areas to fill their gap. At this point in the business process, the founders provide their own funding and work with a small team. (EuropeenInvestmentBank, 2021)

- Seed stage

The seed stage is when members of a startup approach investors for funding support. They develop a "seed," or business that they hope to grow. During this stage, you may also develop your business plan, mission statement and goals. This is also when you begin creating a timeline and assess if you have the necessary resources and expertise to deliver. Other things to brainstorm in the seed stage include:

- Business name
- Website URL or domain
- Business plan

- Start-up stage

Once you gather research for your business, you can put it into practice. This is when your company launches. In this step, you work on development components, such as putting a team together and securing funding. A startup business also does frequent product testing

and tries to increase its customer base. In this stage, you focus on collecting customer feedback to discover how to enhance their experience with your company and make your product more beneficial. (EuropeenInvestmentBank, 2021)

- **Growth stage**

During the growth stage, a startup has reached the level of having a consistent customer base and a steady source of income. This is when the company's cash-flow begins to increase rapidly. Because the company is growing, this is when a business may start to hire more employees to help manage the workload. Your business also has a clear business model at this point and uses a refined marketing budget. (UniversityofOregon, 2022)

- **Established stage**

The established stage is when a company becomes a thriving business. Here a loyal customer base starts to form and things become more predictable for cash flow. Once a company reaches an established status, it may be easier for them to financial resources and human labor. However, the entrepreneur remains alert and continues growing the customer base to help them move on to the expansion stage. (UniversityofOregon, 2022)

- **Expansion stage**

In the expansion stage, a business experiences growth in new markets and distribution channels. During this stage, a business tries new ventures and profit options. This is also when a business may decide to start offering a new line of products or services to accompany their current ones. They do this as a way to reinvent themselves and renew their growth in the marketplace. For instance, a shoe company may decide to sell socks as well. (UniversityofOregon, 2022)

- **Maturity stage**

The maturity stage is when a business reaches a consistent revenue across a long period of time with returning loyal customers. By this point, the business owner becomes less involved in the daily operations as a management team takes over. Those businesses that reach a mature status have a stronger presence in the market and are aware of their brand perception. (EuropeenInvestmentBank, 2021)

- **Merger and acquisition stage**

The acquisition stage sometimes occurs when another company decides to buy the business to gain control. Businesses also may merge with others to combine operation efforts and resources. Both actions serve as a way to create shareholder value and expand a company's reach. Merging can help diversify products and reduce risks. However, selling a company can help business owners who experience a large growth beyond their capabilities.

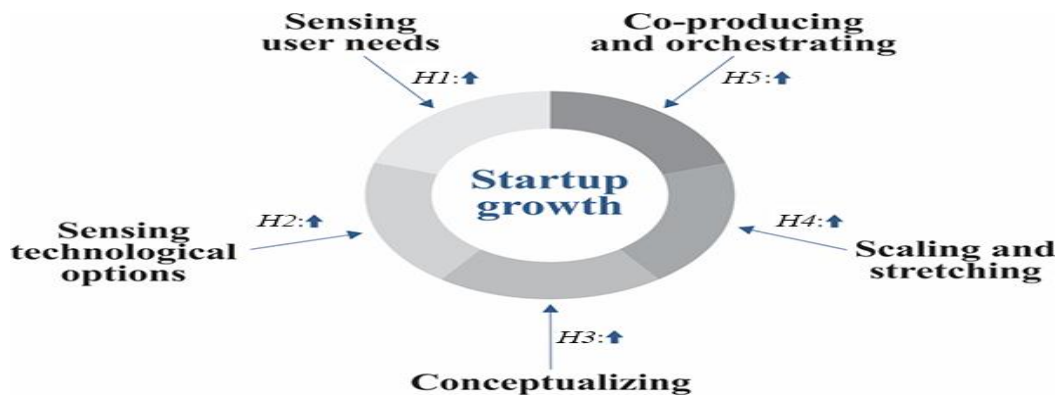
We describe companies through several characteristics recognized in the literature as having a potential influence on the growth of start-ups. (UniversityofOregon, 2022)

Table 1. The Growth Factors of a Start-up

Factors related to company characteristics
Sector of activity (E-commerce, software, industry/chemistry, health/biotechnology, consumer goods, electronics, energy, other)
Geographic area (head office department)
Age of company
Number of subsidiaries (external growth)
Number of patents / licenses (level of innovation)
Young Innovative Company (JEI) status and tax credit
Research (CIR)
Support (incubator, competition, BPI France, Entrepreneurs network, nurseries)
Factors related to the company's governance structure
Legal structure (SARL, SA, SAS, SCA, other)
Status of manager (President, Managing Director, CEO, Manager, Other)
Presence and size of the board of directors / board of directors
Monitoring
Presence of independent directors
Number of shareholders
Presence of a shareholders' agreement
Composition of capital (founders, employees, Business Angel, investor capital, university, industrial, financial market, Love Money)
Presence and size of the management team
Presence and size of the strategic committee
Presence and size of the scientific committee
Research partnerships
Factors related to manager's characteristics
Optimal Simulation Level (attitude towards risk – Appendix 5)
year of birth
Sex
Level of education
Main skill brought to the company (Expertise scientific and technical, economic and financial, managerial, legal and legal, other)
Founder status
Presence and number of co-founders
Entrepreneurial experience (number of businesses created or managed in the past)
Functional experience (experience in the company's sector of activity)

Source : <https://www.indeed.com/career-advice/career-development/startup-growth-stages#:~:text=During%20the%20growth%20stage%2C%20a,to%20manage%20the%20increased%20workload>

Fig.1. Start Up Growth



Source : <https://www.slingshotapp.io/blog/creating-a-startup-growth-strategy>

7. The Advantages and Disadvantages of a Start-up

The start-up confers advantages but also has some disadvantages.

7.1. The advantages of a start-up

The innovative young company spirit is a different way of seeing things and breaks the “work codes”. (Charlie, 2024)

- The development of a creative mind is an advantage in this type of business. Moreover, along with other factors, this character certainly contributes to the success of the SME. The creative spirit allows us to innovate and avoid any form of inactivity within the company.

This form of business is appreciated for the atmosphere that reigns there. The goal is to break conventional behavior and simplify exchanges in order to improve relations between employees and employers.

- Another advantage is flexible supervision. Indeed, when working in a startup, there are fewer strict rules to follow. For example, casual dress codes for employees or flexibility in working hours. Thus, the abolition of formulas and restrictive regulations makes it possible to establish a motivating atmosphere at work, and to improve the performance of the young company.

7.2. The disadvantages of a start-up

The absence of strict supervision can sometimes constitute a limiting point in the life of the company. (Charlie, 2024)

- Due to the discretion of the hierarchy within this entrepreneurial form, it can be difficult to make decisions in some cases.

- The company will not hesitate to hire and promote quickly; which inevitably leads to casting errors and/or pressure that is difficult to bear for those new to the job.

- Finding yourself lacking the financial means necessary to make your projects a reality. As a result, it is not uncommon to see some start-ups declare bankruptcy after the launch phase.

8. Academic Star-ups and Universities

For universities, start-ups have become the symbol of a dynamic contribution to regional innovation. (UniversityStatrups, 2023)

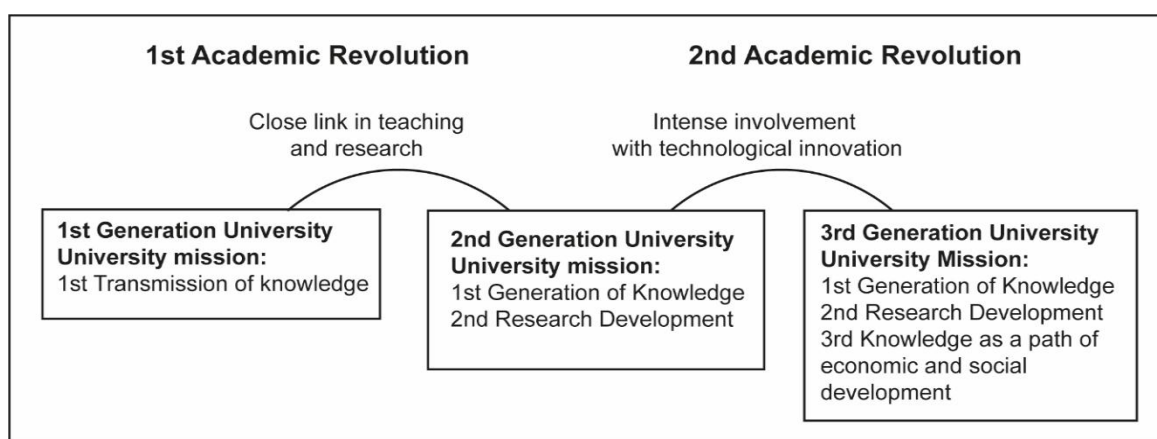
The place of the University in the new territoriality then seems characterized by:

- The creation by the public authorities of territorial structures whose mode of operation is based on proximity and cross-functionality and which aim to promote regional coordination for a shared project: research and higher education centers (PRES) which have given way with the ESR law of 2013 to communities of universities and establishments (COMUE), thematic networks for advanced research (RTRA), thematic networks for research and care (RTRS), competitiveness clusters, etc.;

- Financial support for higher education and research by local authorities;

The emergence of the territorial dimension in the engineering of higher education and research policies... (UniversityStatrups, 2023)

Fig.2. The evolution of the institutional context of Universities



Source: https://www.researchgate.net/figure/figure/figure-One-A-Model-of-Institutional-Change_fig1_314801979

8.1. Paris Parc, 15,000 m2 dedicated to Sorbonne University Spin-offs

A real interface between the world of business and that of the university, Paris Parc's main objective is to bring together in a single place the actors of innovation and entrepreneurship of the Sorbonne University Alliance: the acceleration of technology transfer (SATT) Lutech, the Sorbonne seed fund, the Agoranov incubator, but also the university departments concerned, the Carnot institutes and the student entrepreneurship centre. (Lee, 2020)

The integration in common spaces of these different actors will consolidate and highlight this ecosystem of innovation and entrepreneurship whose expertise is already recognized.

Open to the outside world, Paris Parc will be an additional lever for collaboration with socio-economic circles. It will integrate a business incubator, a business hotel, meeting and conference places as well as a branch of our FabLab SU.

It will accommodate, from design to technological maturation through support and transfer, start-ups, SMEs, SMIs, mid-sized companies, branches of large groups and competitiveness clusters. (Lee, 2020)

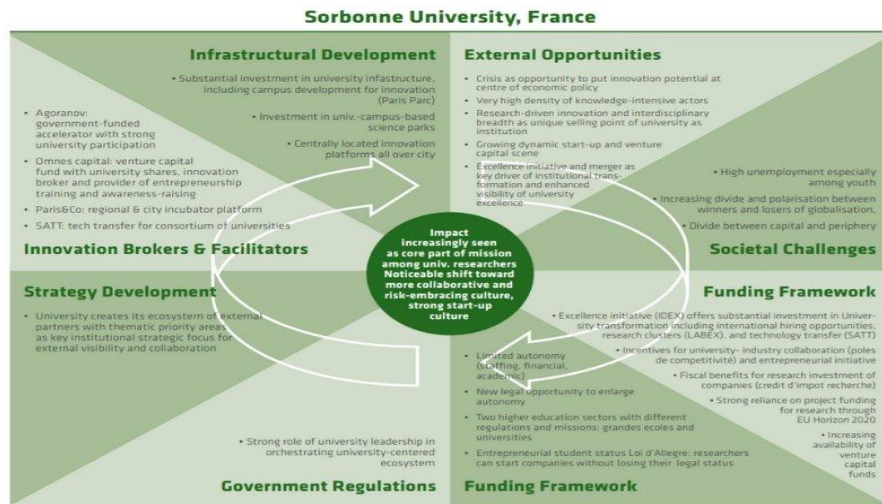
As such, the report details the Paris Parc project "dedicated to spin-offs of university laboratories as well as spin-offs and branches of innovative companies", supported by Sorbonne University and which plays "a key role in its economic development. "

The new 15,000 m² building, which will be built from 2019 to 2021, intends to "offer a 15,000 m² office space, an incubator, an accelerator for emerging start-ups as well as a

business hotel". . Paris Parc "has been developed to create a place, in the heart of Paris and on the university campus, in the immediate vicinity of the university laboratories, which will combine academic excellence and reception capacity to transform academic knowledge into economic value".

This infrastructure "responds to an increasingly strong demand from innovative companies to access and share expensive and complex research infrastructures, to use the high concentration and diversity of qualified personnel on campuses, to access promising trainees and young high-level graduates and to engage in innovation and entrepreneurial activities with a high concentration of partners in a dynamic ecosystem". (Linkedin, 2023)

Fig.3. The role of the Sorbonne University in the creation of Start-ups



Source: <https://www.eib.org/en/projects/all/20200153>

8.2. Academic start-ups at the Sorbonne University

Along with training and research, innovation is one of the major missions of the university. For many years, Sorbonne University and its partners have built an innovative ecosystem that has given rise to numerous successes: patents, licenses, partnership research, joint laboratories with companies, business creations by staff, students or alumni . (Linkedin, 2023)

Winner of the French Tech Seed call for projects with its Alliance partners, Sorbonne University and the establishments associated with it have built an innovative and efficient ecosystem: Innovation chair at Celsa, Satt Lutech, Sorbonne seed funds, incubators vision, brain and spinal cord institutes as well as Agoranov, Pépite Paris Centre, etc.

With 230 startups created since 2010, the Sorbonne University Alliance benefits from a real dynamic in terms of innovation, as evidenced by the launch of a second Sorbonne investment fund.

The university is also continuing its actions around student entrepreneurship and, through support and training programs, arouses the desire for entrepreneurship within the university community.

Table 2. Academic start-ups at the Sorbonne University

Academic start-ups
SATT Lutech
Quadrivium Ventures
Silver innov
Agoranov
GEMA (Walk-E)

Source: <https://www.eib.org/en/projects/all/20200153>

8.3. PSL Tech Seed

The PSL Tech Seed system allows technology start-ups from PSL University and the Institut Pasteur, supported by one or more private investors (business angels, venture capital, industrialists, etc.), to access co-financing provided by Bpifrance, via the French Tech Seed fund. (EuropeanInvestmentBank, 2021)

In order to support technological start-ups in their post-maturation or pre-seed phase, the Future Investments Program has endowed the French Tech Seed investment fund with 400 million euros. To benefit from it, start-ups must first be labeled by business introducers, themselves labeled by Bpifrance.

Thirteen projects from PSL – Pasteur have been labeled by PSL Tech Seed since the creation of the system in January 2019.

- **AGS Therapeutics (ENS - PSL):**

Develops innovative therapeutic solutions, which can be bioproduced via extracellular vesicles of microalgae.

- **Aqemia (ENS-PSL):**

Affinity calculations between molecules and therapeutic targets for drug design and drug discovery.

- **C12 Quantum Electronics (ENS-PSL):**

Develops quantum processors based on carbon nanotubes to accelerate complex calculations and develop the computer of tomorrow.

- **Energo (Chemistry Paris-PSL):**

Develops a revolutionary chemical synthesis technology by combining heterogeneous catalysis and cold plasma, at ambient temperature and pressure, without the need for pretreatment. (EuropeanInvestmentBank, 2021)

- **Honing biosciences (Curie Institute):**

Creation of a technological platform aimed at optimizing the efficacy and safety of cellular therapies in cancers and chronic diseases.

- **Humink (ENS-PSL, IPGG-PSL):**

Develops a new additive manufacturing technology at the nanometric scale, allowing any material to be deposited on any surface, with unprecedented freedom of design.

• **Iconeus (ESPCI Paris-PSL, ENS-PSL):**

Develops neurofunctional acoustic imaging solutions for research and clinical applications.

• **Minos Biosciences (ESPCI Paris – PSL):**

Offers a single cell, multimodal, 2D analysis system for basic, applied, and clinical research and diagnostics.

• **Leanear (ENS – PSL):**

Offers innovative solutions, based on the latest advances in cryptography, for end-to-end secure data storage and synchronization.

• **Sublime Energy (Mines Paris – PSL):**

Offers a solution for the collection, purification and liquefaction of biogas that significantly lowers the profitability thresholds and makes it possible to develop methanization near production sources.

• **Skiagenics (Curie Institute):**

Develops molecular diagnostics and precision medicine solutions, based on genome analysis and biomarker identification. (EuropeanInvestmentBank, 2021)

• **UVR (Mines Paris – PSL):**

Offers all the tools necessary for the generation of "Iso-Photographic" computer-generated images, i.e. indistinguishable from a photograph of the object concerned.

Conclusion

The contribution of universities to the management of territorial entrepreneurial proximity and academic start-ups seems to imply strong institutional action to avoid, in particular, a territorial fracture of the entrepreneurial dynamic, in terms of technology transfer between research laboratories and companies, such as entrepreneurial support. If universities are seen as actors in the development of all territories, it is then a question of creating regulatory frameworks authorizing the constitution of appropriate research/territory interface structures, based on a logic of belonging and similarity.

The formalization of the coordination of entrepreneurial collective action presupposes organizational methods capable of promoting the transfer of knowledge outside of geographical proximity.

Contractual procedures, more or less explicit, linking the universities to the stakeholders of territorial entrepreneurial proximity and academic start-ups via a reciprocal formal commitment, and which specify the commitments in terms of contributions and creation of added value of these stakeholders can support this formalization. The objective is to "contractualise", in particular through public/private partnerships.

Sorbonne University and its faculty are at the heart of an environment of innovation that enables it to work with different players, intervening in a variety of ways in the world of industry and in society.

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