

Contributions of Innosuisse and SNSF funding to the emergence and development of science-based start-ups

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Abstract

The Swiss National Science Foundation (SNSF) and the Swiss Innovation Promotion Agency Innosuisse are federal funding organisations with different mandates. To support a successful start-up landscape in Switzerland, the two organisations provide different impulses and contributions in accordance with their funding mandates, which interact at various interfaces. The SNSF and Innosuisse commissioned the present study to understand and present the mechanisms for the emergence and development of science-based start-ups and to analyse possible optimisations of the funding portfolio. The study focuses on the following two main questions:

1. What contribution do the SNSF's research funding and Innosuisse's innovation funding make to the emergence and sustainable development of science-based start-ups in Switzerland?
2. What influence does the interaction of the two organisations' funding have on the emergence and sustainable development of science-based start-ups in Switzerland? Where are there gaps or a need for action? What recommendations can be derived?

To answer the questions, a comprehensive online survey was conducted among Swiss start-ups founded since 2011. A total of 470 of the 2,124 start-ups contacted took part in the survey (participation rate 22%). Further survey methods were:

- Interviews with programme managers on the design and interaction of the funding activities of Innosuisse and the SNSF in start-up funding.
- Interviews with experts on the evaluation of funding activities and the start-up ecosystem in Switzerland
- Interviews with founders for case studies on the influence of the funding received on the founding and development of the start-up.
- Research on funding approaches and instruments in Finland, the UK, Israel and the Netherlands with a focus on science-based start-ups.
- Funding data, secondary statistical sources and a literature review on factors influencing the success of science-based start-ups and spin-offs.

Science-based start-ups are characterised by the following features (Startup Radar 2021):

- They pursue a science- and technology-based approach,
- Their service offerings are the result of their own innovations or the further development of novel solutions from other companies or institutions,
- Their business model is scalable,
- They pursue ambitious growth targets, and
- Their business activities are geared towards the global market.

The founders' organisation of origin or previous activity does not play a role in this definition.

The study differentiates according to the **origin of the founding idea**. Three groups are considered with different founding origins:

- exclusively in a scientific institution (university, university of applied sciences, other research institution),
- partly in a scientific institution (whereby other activities also played a role),
- outside a scientific institution (e.g. large company, freelance activity).

An important subgroup of start-ups with a founding origin in a science institution are spin-offs. These are start-ups that arise directly or at a distance from an activity at a university or research institution and implement research results from this activity into market-ready products, services, processes and business models.

Start-up ecosystem and funding system for scientific start-ups in Switzerland

The majority of the experts and founders surveyed rated the environment for science-based start-ups in Switzerland as good to very good, in terms of science, research and technology. **The funding system functions very well and is largely known in the target group**, but the complexity is also increasing due to the large number of funding opportunities and topics. The technological inventiveness, the high level of education and the professional support in the utilisation of scientific results at the universities were also positively highlighted. On the other hand, the commercialisation of products from start-ups was viewed critically, especially the international marketing was relatively weak compared to other start-up ecosystems. With regard to the capital market, the lack of venture capital was mentioned, especially for large financing rounds in growth phases (from CHF 2 million).

The SNSF and Innosuisse have developed a research- and innovation-oriented funding offer that covers the entire chain from the promotion of fundamental knowledge or scientific findings, through application-oriented basic research, to science-based innovations and thus also start-ups and spin-offs. **The two organisations are positioned complementary to each other according to their respective missions.** While the SNSF is responsible for promoting research in all scientific disciplines, Innosuisse pursues the task of promoting science-based innovations in the interest of the economy and society. The BRIDGE programme developed by the SNSF and Innosuisse is positioned between basic and applied research and is designed as a bridge between research and innovation funding (BRIDGE Discovery) and direct support for exploitation and start-ups (BRIDGE Proof of Concept).

The two institutions can influence individual factors, especially those specific to entrepreneurs and companies. They indirectly strengthen the start-up process by strengthening the knowledge and competences of the founders, which often form the scientific or technological basis of the subsequent start-up (in particular project funding/NFS/NFP SNSF, innovation projects/international projects Innosuisse, BRIDGE). Innosuisse also directly influences the start-up process by strengthening the start-up-relevant skills of the founders (via training and coaching) as well as the formation and development of the start-ups (e.g. business models, internationalisation).

Characteristics of start-ups from science institutions

Start-ups with and without origins in science differ in many aspects and thus contribute in a complementary way to the diversity of start-up activity in Switzerland. Of the 470 start-ups that took part in the survey, 42% had their origins in a scientific institution and 58% outside. These proportions presumably do not correspond to the basic population of all science-based start-ups in Switzerland, since the start-ups funded by Innosuisse responded with above-average frequency and are also overrepresented in the survey sample. When looking at the results, the focus is on start-ups from science institutions.

In the case of start-ups from scientific institutions, the origin of the start-up is in most cases at a university (79%; ETH Domain 50%), less so at universities of applied sciences (19%) or at other research institutions (17%; multiple answers possible). In most cases, these start-ups arise in the context of a scientific activity (45%) or a scientific qualification (36%), less frequently during studies (27%). Most start-ups with their origin in a scientific activity or qualification (spin-offs; N =

129) arise from an applied research environment (71%) or from industry-related research (37%); a notable proportion of start-ups also arise from basic research (19%). In most cases, the start-up takes place during the scientific activity (43%) or directly afterwards (24%), in some cases up to 2 years afterwards (19%) or at a greater distance from the scientific activity (21%). Start-ups from science institutions are thus characterised by a rapid translation of research knowledge into concrete start-ups and thus innovations.

Start-ups from science institutions are more science- or technology-oriented, characterised by their own innovations, make more contributions to radical, disruptive innovations and are more oriented towards the global market than the other science-based start-ups. The two groups, on the other hand, do not differ in terms of growth orientation. Science-based start-ups are more often in the "medicine and healthcare" and "chemistry and pharmaceuticals/biology" sectors, and less in "information and communication technology", than start-ups with a founding origin outside of science. For the majority of start-ups from science, the business idea consists of a new product (87% vs. 62% outside; multiple statements possible), less of new services (28% vs. 42% outside), significantly less of innovative business models (4% vs. 21% outside) or social innovations (4% vs. 17% outside).

Start-ups with origins in science differ from the other start-ups in their innovation characteristics, in the build-up steps and in the company development: In the first group, the research and development expenditure (measured in terms of turnover, personnel) for the creation of innovative service offerings up to market entry is higher, the time span until the break-even point is reached is longer and the amount of funds flowed until then is greater. For start-ups from the scientific community (and to an even greater extent for those funded by the SNSF and/or Innosuisse), the search for investment capital is important (75% conducted investment talks), they are more often successful (60%) and more risk-bearing capital flowed than for the other start-ups. Together with the growth orientation, this suggests substantial economic and technological impacts by start-ups from science institutions. Such start-ups registered patents significantly more frequently (62% of them at least 1 patent) than those with a founding origin outside (36% at least 1 patent).

The participation of women in start-ups is far below the proportion of university graduates in the disciplines typically represented in start-up teams. The share of women among all founders is only 15%. In 33% of all surveyed start-ups there is at least one woman in the founding team; in the case of start-ups from academia, this rate is slightly higher at 40%. The younger start-up cohorts also have a slightly higher rate. Significantly more women take part in Innosuisse start-up training (2020: 43%) than actually take the step into self-employment - this is a starting point for making greater use of the start-up potential of women. The founding teams (typically 3 members) often combine several years to long professional experience in practice and science as well as diverse competences after technical-scientific and economic courses of study, not infrequently also doctorates. Universities are thus of direct (as the origin of the start-up) and indirect importance (as the training centre for the later founders).

Findings on SNSF and Innosuisse funding

Of the 129 spin-offs responding to the survey, 80% stated that the scientific activity or qualification took place within the framework of publicly funded research. **In addition to Innosuisse funding in innovation projects (39% of spin-offs), the SNSF (35%) and Bridge "Proof of Concept" (23%), EU programmes (24%) and universities' own grants (38%) were also highly relevant.** In many cases, multiple funding sources were mentioned, i.e. the start-up ideas stemmed from different research with different funding. According to the respondents, research funding from the

SNSF and innovation funding from Innosuisse provided the impetus for the technological basis of the start-up or the core of the business idea and significantly led to start-up-relevant competencies and network relationships. **Start-ups from SNSF, Innosuisse and BRIDGE funding are even more science- and technology-based than the other start-ups from science and are characterised by product innovations, want to make more frequent contributions to radical, disruptive innovations and focus their business activities more strongly on the global market. Technologically ambitious start-ups emerge from this funding.**

Since Innosuisse funding was an important source in the sample, a large proportion of the start-ups surveyed had taken advantage of at least one Innosuisse offer for further qualification, advice and coaching, and other support. **The use of these offers was particularly high for start-ups from science (85%) and for ideas from SNSF/Innosuisse/BRIDGE funding (87%) and somewhat lower for start-ups with another origin (63%).** The contribution or benefit of Innosuisse's training and coaching is generally rated as good by the participants surveyed, although it varies according to the subject area. The benefit was rated best for the acquisition of start-up-relevant competencies and the further development of the business concept and corporate strategy. In the case of the training courses, the benefit was rated somewhat lower for the acquisition of investors, and in the case of coaching for the aspects of orientation towards international business activity and the development of customer groups. Founders from academia generally rated the benefits of training and coaching even higher than founders from outside academia. A differentiated picture also emerged in the case studies in which the training and coaching were assessed as helpful.

Start-ups with their origins in science have a denser support network than the other start-ups. In addition to Innosuisse, the most important for the development of start-ups are: (1) business angels, mentors, experienced entrepreneurs, (2) friends, colleagues, relatives, (3) other founders, (4) universities, (5) incubators / accelerators. In the case of start-ups that emerged directly from an SNSF project, the SNSF funding was instrumental, as the results of the research work represented the core of the start-up. It is therefore not surprising that those start-ups rated the support from the SNF as the most important support for the foundation.

The country case studies presented - Finland, Israel, the Netherlands and the UK - are each characterised by a different division of tasks between their organisations for funding basic research in particular and an innovation funding agency. The interlocking of individual instruments and the cooperation of the relevant institutions seem to be important for the functioning of the funding system. Validation programmes similar to BRIDGE (validation or further development of research results into innovations through continued payment of wages, linked to research funding) can be found in all countries. Measures such as coaching, mentoring and training for entrepreneurs are usually not offered as stand-alone programmes in the comparison countries, but are part of comprehensive start-up support measures. Access to venture capital for start-ups plays a central role in innovation policy in all the comparison countries (e.g. through tax incentives for investors, public equity funds), and institutional approaches for bringing together founders seeking capital with business angels or venture capitalists are given greater focus in the context of start-up promotion at the various levels than in Switzerland. In individual countries - for example, in the Netherlands - increasing attention is being paid to non-technical and social innovations as a basis for the development of business models within the framework of start-up promotion; the focus on identifying and promoting technology-oriented start-up projects is thus supplemented by a focus on societal and social issues.

Recommendations

Overall, the funding system is well-balanced and is rated as good by both experts and start-ups. The SNSF and Innosuisse complement each other in this increasingly complex funding system according to their respective mandates. The results show selective possibilities for exploiting additional potential. The recommendations are presented here and detailed in Chapter 9 of the report:

1. Create and strengthen incentives for exploitation and start-ups in (SNSF) programmes and projects.

Science-based start-ups are often the result of research work in programmes and project funding from the SNSF and Innosuisse. Based on this finding, it is proposed to create further incentives to increase the exploitation orientation from science towards start-ups, where relevant. Concrete approaches include: **addressing doctoral researchers, students and post-doctoral researchers** more strongly, optimising **BRIDGE as a transfer programme** with the option of start-ups as a central exploitation path, **addressing start-ups as part of the Flagship Initiative and the NTN Innovation Booster** from Innosuisse, and **incentives in SNSF funding measures (e.g. NCCRs, NRPs)**.

2. Checking target group attainment and strengthening potential attainment

The achievement of target groups varies greatly from region to region, according to the origin of the start-up idea/institution and according to gender. For example, start-ups from universities of applied sciences or start-ups by women are clearly underrepresented. The study recommends addressing **public research more systematically in order to open up start-ups on a broad scale**. This concerns in particular the mobilisation of demand in different institutions, regions and disciplines. Furthermore, the study recommends the development of **measures to increase the quota of women in start-ups**.

3. Strengthen the success factor of training and coaching in selected areas and exploit the potential for utilisation

The start-up training and coaching offers are central elements of Innosuisse's start-up support. The benefit of these offers is rated as rather high, although it varies according to topic, as explained above. Based on the results of the survey, we recommend **reviewing and expanding the learning content of training courses, reviewing and, if necessary, adapting the topics in coaching, as well as including non-technical innovations and business models more in the support**.

4. Address the internationalisation of start-ups more strongly

The study shows that there is great potential in internationalisation. For example, almost a quarter of all spin-offs that emerged from publicly funded research received funding from EU programmes. The study therefore recommends **strengthening the internationalisation of start-ups**, for example through corporate funding for international projects, communicating good examples of **international research and innovation funding**, and specifically involving start-ups in connection with **cross-border cooperation projects**.

5. Interaction and interlocking of the instruments of the SNSF and Innosuisse in start-up support

Both funding organisations can develop even more potential by further intensifying their cooperation and achieve a leverage effect with regard to the exploitation of research results via spin-offs. We recommend that the SNSF and Innosuisse work together to optimise communication: to strengthen **communication on the social and economic benefits of exploiting** research results into start-ups, to **proactively address the target groups** (including doctoral students, post-doctoral researchers) and to communicate more **successful examples of exploitation and start-ups**. With regard to the structural coupling of the respective programmes and projects, we recommend: examining a more systematic **approach to start-up funding on the part of the SNSF** (creating material and immaterial incentives), tapping into the **start-up potential in the run-up to or within the framework of BRIDGE Proof of Concept and start-up training through idea workshops**, and developing and establishing overarching training and qualification offers on exploitation topics for start-ups from science.

6. Access to risk-bearing capital as an important prerequisite for the utilisation of innovation potential, especially for start-ups from the scientific community

The expert interviews have shown that access to venture capital is a challenge and that there is a gap, especially for large amounts (CHF 2 million or more). This problem should be addressed, especially due to the high capital requirements for science-based start-ups. For this reason, we recommend **examining the feasibility of a publicly initiated venture capital fund along the lines of the High-Tech Start-up Fund in Germany** and, on this basis, examining **coordination between the SNSF/Innosuisse and the venture capital fund to be set up**.