

Commission for Technology and Innovation CTI

Impact analysis R&D project funding of the CTI

Regular R&D project funding and follow-up on the special measures 2011/2012

Summary

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Starting position

The Commission for Technology and Innovation is the federal promotion agency for science-based innovation. The CTI's remit is to promote science-based innovation in Switzerland by providing funding to universities, offering advice and fostering networks to benefit the Swiss economy. It has four main activities:

- R&D project funding (research and development projects),
- Promotion of entrepreneurship and start-ups,
- Knowledge and technology transfer (KTT) support,
- Development and operation of Swiss Competence Centers for Energy Research SCCER for renewable and efficient energies from 2013.

The total funds for these principal activities amounted to CHF 209 million in 2015. **R&D project funding** makes up the largest share. The CTI awarded funds of CHF 127 million¹ in this area in 2015. In the last five years, implementation partners and research institutions have submitted an average of 700 regular R&D projects every year, of which almost 370 were approved on average. The number of projects submitted rose sharply between 2008 and 2015 (2008: 444 projects; 2015: 729 projects).

In 2011 the CTI received additional funding from the Confederation for a set of accompanying measures for R&D project funding to mitigate the effects of the strong Swiss franc (**2011/12 special measures**). The appreciation of the Swiss franc from the beginning of 2010 has placed increasing pressure on the Swiss export industry and threatened to choke economic growth. Against this backdrop, the Confederation approved additional funding to the tune of CHF 100 million for innovation promotion by the CTI in October 2011. These special measures (CHF 100 million in the last quarter of 2011) saw the CTI's 2011 ordinary budget for R&D project funding double in a very short space of time.

The CTI would like to evaluate the impact of the regular R&D project funding and the 2011/2012 special measures and therefore awarded an evaluation mandate to the consortium of INFRAS and KOF (Swiss Economic Institute) in a WTO tender. Two other evaluation mandates on the funding lines start-up promotion and CTI entrepreneurship were awarded at the same time. The evaluations will deliver indicators for CTI's impact assessment work. The two other evaluation modules are not dealt with in this report.

¹ Excluding the first phase of special measures to mitigate the strong Swiss franc, in which an additional CHF 36.2 million was awarded.

Aim and methodology of the evaluation

The evaluation is split into two modules:

- **Module 1: Follow-up on the impact of the 2011/12 special measures:** An initial evaluation of the special measures was already conducted in 2013² looking at the concept and implementation and the initial impact 1-2 years after the funded projects were launched. This follow-up is intended to provide a conclusive summary of the impact of the 2011/2012 special measures.
- **Module 2: Evaluation of R&D project grants:** The primary aim of this evaluation is to obtain empirical evidence on the impact of R&D project funding. It also aims to evaluate the concept and implementation and set out suggestions for improvement. In addition, it is one of the CTI's aims to develop its impact assessment activities on the basis of external impact analyses.

The evaluation is being conducted in two phases. In the first phase, a follow-up on the impact of the special measures was carried out between November 2015 and December 2016, which means the evaluation of the special measures is now complete. With regard to regular R&D project funding, the evaluation of the concept and implementation and an initial survey on the impact were carried out in the first phase. This report comprises the results of the first phase. In the second phase of the evaluation (to be completed in Q3 2018), the survey on the impact of regular R&D project funding will be repeated, so that long-term effects can be gauged.

This evaluation and impact analysis draws on a broad mix of qualitative and quantitative research methods:

- Analysis of CTI documents and internal data;
- 25 qualitative interviews with stakeholders/ representatives of the Confederation, the CTI, trade associations and universities;
- 25 qualitative interviews with research and business partners who received funding;
- Broad, standardised online surveys of all business and research partners from funded and non-funded projects on the implementation and impact of the support;
- Econometric analysis to compare the impact on the economic indicators of supported companies and those not involved in CTI projects.

The interviews were mainly used to analyse the qualitative questions on concept and implementation in more depth. The online surveys collected information on project implementation and on the economic and other effects on business and research partners. The econometric

² Cf. von Stokar et al. 2014.

analysis allowed the additionality of economic impacts on business partners to be determined, i.e. compared to the situation without CTI funding (policy-off).

The standardised online surveys took place between the end of April and mid-June 2016. In total, more than 5,000 business and research partners were contacted, of whom just under 1,500 completed the questionnaire in full, which equates to a response rate of 28%. The response rate can be considered satisfactory to good. The response rate is split as follows across the different target groups:

Table 1: Online survey response rate

	Business partners	Research partners
Regular R&D project funding		
funded	25%	34%
not funded	18%	17%
2011/12 special measures		
funded	53%	51%
not funded	24%	45%

Table INFRAS. Source: Online survey of business and research partners

The CTI's regular project funding – concept

Principles and instruments of R&D project funding

Besides federal government research (Swiss Federal Office of Energy, Federal Office for the Environment, etc.), the main players active in the promotion of research and development at federal level are the Swiss National Science Foundation (SNSF) and the CTI. While the SNSF focuses on basic research, the CTI mainly concentrates on applied research. The CTI's R&D project funding aims to encourage universities and companies to carry out joint projects. The projects focus on *science-based innovation*. The topics are generated using a *bottom-up* approach and awarded on a competitive basis (economic/social benefit, market implementation, innovative content, scientific relevance). The aim is to encourage and strengthen primarily private sector innovation activities based on the *principle of subsidiarity*, in other words funding projects that without federal funding would (probably) not go ahead. To reinforce this principle, the CTI requires companies to provide a minimum amount of funding themselves (minimum contribution 50%, minimum cash contribution 10%). In addition, *no funds are paid directly to companies*; instead the contributions are allocated directly to research institutions. Over 95% of the funds

awarded are contributions to research institutions' personnel costs. In principle, the CTI supports projects at various stages of the innovation cycle, i.e. those that are closer to basic research ('science-driven innovation') and those that are closer to market implementation ('market-driven innovation'). The CTI uses the following instruments:

- **R&D innovation projects** involving at least one university partner and one business partner. The project duration is between 12 and 36 months;
- **Projects with no business partner** whereby riskier projects with high innovation and market potential are supported. For example, this could involve demonstration units, models or clinical studies;
- **Innovation cheques** allow SMEs to work with universities to flesh out their innovation and project ideas (small pilot studies). The CTI contribution is limited to CHF 7,500;
- **CTI Vouchers** support the R&D projects of business partners who can submit simplified applications without a research partner in the initial phase. Business partners are then helped to find suitable research partners.

In addition, within the scope of KTT support, the CTI also has additional instruments that are closely linked to R&D project funding:

- **Innovation mentors** who help companies by highlighting funding opportunities, facilitating access to technology and research and assisting with project applications.
- **National thematic networks (NTN)** offer exchange and networking opportunities throughout Switzerland for research and business partners in eight topic areas (2013-2016 ERI period), to bring the right partners together in order to realise innovation projects.

Evaluators' assessment

The CTI's concept is coherent and constructive

The Federal Research and Innovation Promotion Act (RIPA) stipulates that among other things innovation promotion must bear in mind the project's contribution to competitiveness, value creation and employment in Switzerland (Art. 6 para 4), and its contribution to the practical training of young researchers at universities (Art. 19 para 2 RIPA).

We consider the basic principles of the CTI's R&D funding to be coherent and in principle appropriate for achieving these overarching aims of the Confederation. By supporting joint knowledge-based innovation projects, CTI funding focuses on stepping up cooperation and knowledge transfer between research and business, and promoting science-based entrepreneurship. The Swiss approach fundamentally differs in two respects from R&D project funding abroad, where research topics are often prescribed in a top down manner by government pro-

motion agencies and funds are paid directly to companies. As this evaluation shows, the bottom-up funding approach without thematic restrictions and the unilateral payment of grants to research institutions is well accepted by business and research partners; for stakeholders, these aspects are uncontested and are considered strengths. Another asset of bottom-up funding is the fact that it allows topics to be generated by the market. To what extent this principle means that some important fields of innovation that are failing on the market may miss out, is unclear. It should be noted, however, that through the national thematic networks instrument and the R&D projects in the field of efficient and renewable energies receiving specific energy research funding, the CTI has already taken a step towards thematic consolidation.

Incentives for research-driven innovations

Because funding is paid to research partners, the impetus for submitting projects predominantly comes from research partners³. The basic concept of the CTI's R&D project funding thus provides incentives for projects to be driven by universities. However, it is impossible to say whether projects initiated by businesses or those initiated by research institutions are more innovative or successful. That said, this study provides indications that projects that are initiated by both sides are more successful than those where the impetus primarily comes from one side. Furthermore, projects that are initiated jointly or by the business partner itself tend to be of greater subjective benefit to companies than those where the research partner takes the lead.⁴

Coherent and coordinated instruments

The CTI has developed a differentiated and coordinated set of instruments over the past few years. The instruments are understood by the target groups and cover both science-driven innovations (projects with no implementation partner) and market-driven innovations (innovation cheques, CTI Vouchers). With the exception of the CTI Voucher, the instruments are in high demand and are well established with research and business partners. The CTI also has low-threshold instruments for R&D project funding in the shape of innovation cheques and innovation mentors, which reduce the barriers to entry for SMEs. Innovation mentors advise companies on research and input options and offer support with submitting applications. Finally, the eight national thematic networks (NTN) promote exchange and networking among research and business partners in the defined thematic fields.

³38% impetus from research partners, 26% each from business partners and from both parties, 9% other.

⁴ Impetus from both sides: 73% positive benefit assessment, impetus from business partner: 65% positive benefit assessment, impetus from research partner: 56% positive benefit assessment.

Links to Swiss National Science Foundation (SNSF) basic research still lacking

Overall, only a small number of R&D projects (around 10%) build on substantial preliminary basic research carried out by the Swiss National Science Foundation. The interviews also indicate that the CTI's R&D project funding at the interface to the SNSF does not yet cover the whole life cycle of research innovation. There seems to be a particular need for a programme like the planned 'Bridge' instrument of the CTI and SNSF, to close the gap between basic research and application. This 'Bridge' instrument is being introduced in the ERI dispatch for 2017-2020 in collaboration with the SNSF in order to achieve the Confederation's aim of taking a more holistic view of innovation across the entire value chain, from basic research to application and market-oriented innovation.

Regular R&D project funding – implementation

Implementation by the CTI

The organisation of the CTI is set out in the Federal Research and Innovation Promotion Act (RIPA), the corresponding ordinance (RIPO), the funding regulations and the rules of organisation. Project applications are assigned to one of four funding areas and evaluated by the relevant committee members. The CTI Secretariat takes care of operational project management, prepares business dealings and implements decisions.

To submit applications, project partners submit an application form, which is also available in electronic format (CTIanalytics). Information must be provided on the economic and scientific/technical goals, innovative content, the position of the project within the applicant's own R&D activities, as well as a research and development plan and a financial plan.

Applications are reviewed by around 70 committee members. The project applications are assigned to one of four funding areas. An assessor and co-assessor then each independently carry out an evaluation. In the 4-6 weekly meetings (in total around 45 meetings per year in the four funding areas), the applications are discussed and the committee members make decisions: project rejected, project rejected but rework possible, project approved with/without conditions, project approved with preliminary work.

Project implementation: Throughout the duration of the project, project partners are appointed a CTI expert (committee member) to supervise implementation. Project partners must deliver progress reports to the CTI on the milestones set out in the relevant project and payment plans. The achievement of milestones is reviewed by CTI experts. Interim reviews (go/no-go meetings) are also held with project partners.

Communication: The CTI provides information on R&D funding via various channels. These include the CTI website, innovation mentors, the CTI's national thematic networks and other thematic platforms within the scope of the CTI's KTT support. The CTI also appears at events in the field of innovation promotion.

Controlling: The CTI has an established operational controlling system in place with regard to business performance and service provision. The most important information and key figures are specified in the CTI's activity reports and externally communicated. There is not yet an effectiveness monitoring system in place but the CTI can use this impact analysis to close existing gaps in its effectiveness monitoring.

Evaluators' assessment

The CTI is a streamlined organisation with a high level of expertise

On the whole we consider the CTI organisation to be appropriate: it consists of committee members acting as part-time experts and a relatively streamlined secretariat. Respondents also considered the structure to be efficient and unbureaucratic for the most part. By and large the organisation combines a high level of practical and scientific expertise. The process of monthly evaluation meetings results in short processing and evaluation times.

Sporadic criticism of the expertise and independence of committee members

The specialist expertise of committee members was (naturally) not rated equally highly by all respondents. There was some isolated criticism of committee members being too close to the market, which some felt could compromise their independence. We believe this criticism should not be judged conclusive. On the one hand, this is likely to be in the nature of funding organisations, particularly where committee members are required to have market expertise in order to gauge the market potential of projects. In addition, due to the part-time system of public service, these experts themselves only have limited time to advise applicants on the submission of funding applications. This is why the CTI created innovation mentors.

Complex submission procedure for inexperienced applicants

The research and business partners interviewed considered the submission procedure to be rather complex. Particularly for inexperienced business partners, this is a major hurdle as it entails significant effort (an average of over 10 working days). In some cases, respondents reported duplication and ambiguity on the application forms. Some also considered the CTI's evaluation criteria to be unclear.

The CTI - not well-known enough in some parts of the economy

The 2011/12 special measures significantly raised the CTI's profile. While the overwhelming majority of research partners are now familiar with the CTI, the level of awareness in the business community is much lower, despite the promotional effect of the special measures. According to a survey of Swiss manufacturing companies with more than 20 employees, around 45% are aware of the CTI funding programmes, although awareness has risen by 8 percentage points since 2009. The CTI can use the national thematic networks, thematic platforms and innovation mentors to further raise its profile.

Links to regional innovation systems still poor

Besides the CTI, there are other cantonal and regional public sector bodies that support industry-led innovation, e.g. within the scope of the New Regional Policy NRP and cantonal/regional business development and location promotion. According to players from regional innovation promotion, there is too little coordination between the instruments and activities of the CTI and regional actors. They claim that insufficient use is made of potential synergies.

The CTI's controlling activities need to be further developed

The CTI continues to develop its operational controlling. It ordered this impact analysis to assess effectiveness. In the current ERI period, the CTI plans to complement its controlling activities, to expand them to become standardised effectiveness monitoring and to integrate them in the organisation. Such effectiveness monitoring is essential in order to review the impact of R&D project funding, to be accountable to policymakers and the public and to strategically develop innovation promotion. This evaluation offers a basis for appropriate impact indicators.

Funded projects

The CTI funded an average of around 300-350 projects per year between 2008 and 2015; the approval rate was consistently around 50% (cf. table below).

Table 2: Submitted and approved regular R&D projects

	2008	2009	2010	2011	2012	2013	2014	2015
Projects submitted	444	637	780	565	940	643	662	729
Projects approved	250	319	343	310	447	331	363	387
Rate	56%	50%	44%	55%	48%	51%	55%	53%

Within the scope of the 2011/12 special measures, 545 additional projects were evaluated, of which 245 were approved (45%). These projects are not included in the figures above.

Table INFRAS. Source: CTI activity reports.

The type of supported projects and business and research partners can be summarised as follows:

- Project funding is split into four funding areas: Enabling Sciences, Engineering, Life Sciences and Micro- and nanotechnologies. The CTI most frequently supports projects in the field of Enabling Sciences and Engineering, followed by Life Sciences and Micro- and nanotechnologies. The Enabling Sciences area has become somewhat less important in the last 4 years.
- The main outcomes of funded projects are product innovations (in 40% of cases). Service innovations (24%) and process innovations (23%) are often also stated as results. Organisational and marketing innovations result from 6% and 5% of projects respectively.
- Two-thirds of projects are (very likely) to be brought to market (22% of projects are brought to market straight after project completion, 26% with a delay) or continued as innovation projects (19%). One third of projects are not pursued.
- The supported business partners are mainly small companies with up to 49 employees (55%) and medium-sized companies with 50-250 employees (25%). The proportion of start-ups (5 years old or younger at project submission) is sizeable, at just under 20%. Around 20% of projects involve large companies. A special evaluation of the CTI conducted in 2016 shows that large companies are predominantly co-business partners, accounting for 14% of main business partners and 34% of other business partners.
- The large majority of the funded companies (some 90%) are predominantly under Swiss ownership. Two-thirds of businesses export goods or services abroad.
- The funded companies are distributed in proportion to their economic strength (GDP) with a small relative preponderance in cantons with the most technical and scientific research facilities nearby (Zurich, Vaud, Neuchâtel (CSEM), Zug).
- The proportion of business partners that had a CTI project approved for the first time (new clients) was relatively high between 2014 and 2016, at 54% in 2014 and 57% in 2015 and 2016. The special measures in 2011/12 and the enhanced activities in the field of KTT (innovation mentors, NTNSs) are likely to have been a contributing factor.
- Of the research partners, the CTI mainly funds projects at universities of applied sciences (average since 2008: 50%) and the ETH Domain (29%). Universities (12%) and other research institutions (9%) are less represented, as expected. The share of universities of applied sciences has been increasing since 2008 and is now at over 50%.

Evaluators' assessment

Target group largely reached; untapped potential in the area of social innovations

We feel that CTI's R&D project funding largely reaches its target group, in particular at research facilities. Concerning projects in the health and social field and innovations that mainly benefit

society, there looks to be some untapped potential for the CTI. In terms of innovation type, product innovations predominate. Although the CTI is open to innovations in processes, organisation and marketing, these areas still only make up a small proportion of projects, with process innovations at around 25% and organisation and marketing innovations at 5% each.

Appropriate success rate but room for more project submissions

The success rate for project submissions has been fairly constant in recent years, at 50%. We consider this success rate to be appropriate. It may fall slightly, however, if more demand can be generated. Even if the rate was 45%, the CTI should remain sufficiently attractive, especially as up until now the competition has not been considered very high by research institutions.

Mainly SMEs taking the lead

Some 85% of main business partners are SMEs. The CTI therefore reaches its main target group effectively, in particular in light of the fact that SMEs tend to be less science-based than large companies. Yet the share of large companies at around 15% is not insignificant and raises the question as to whether the involvement of large companies does not result in too much deadweight loss.

Clear division of roles between project partners but some obstacles

There is a clear division of competencies between research and business partners during project implementation: the former are familiar with the CTI and its environment in the vast majority of cases, while business partners bring market proximity and practical relevance to projects. In some cases, however, potential synergies in cooperation are not fully utilised. Business partners in particular state high coordination costs (23%), inconsistent goals (19%) and collaboration difficulties (16%) as (fairly) major obstacles to project success. Meanwhile, research partners cite capacity constraints on the part of business partners as a (fairly) major obstacle (32%).

One third of implemented projects are definitely launched onto the market and an additional third are likely to be launched. The final third are either not continued as innovation projects or abandoned. The rate of projects that are brought to market is positive. It is clear that innovation projects can fail up to a certain point, especially as the CTI also supports risky projects with high innovation potential. Nevertheless, the difficulties in collaboration between business and research partners mentioned above also seem to contribute to the failure of projects to some extent.

Suspected deadweight loss in companies

We talk about deadweight loss when innovation projects would have been implemented anyway without government funding. Conversely, if an innovation project is only implemented because of CTI funding, additionality is achieved. Deadweight loss is difficult to measure empirically. However, this evaluation indicates deadweight loss in 15%-20% of funded projects. Just over half of projects would have been implemented with reduced scope or at a later date without funding, which can be interpreted both as deadweight loss and as additionality. In 25%-30% of projects there is clear additionality. We believe that additionality could be increased overall. We were surprised to note that the level of deadweight loss in regular R&D project funding was similar to that of special measures, which explicitly aimed to support projects with well-developed innovations.

Regular R&D project funding – impact

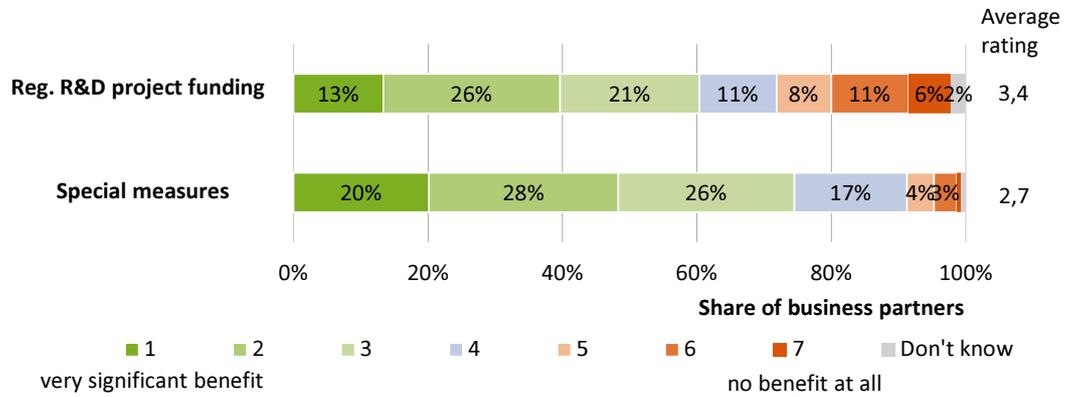
Impact on business partners

As the impact on businesses only becomes apparent in the long-term, it is not yet possible to carry out a conclusive assessment. In the first phase of the impact analysis that is now complete, business partners completed self-assessments and econometric analyses were carried out. The self-assessment shows whether the CTI funding measure *generally* had an effect on businesses. The econometric analysis goes a step further by measuring whether the funding measure had an *additional* impact, i.e. compared with the scenario of the business not receiving funding. An additional survey will follow in 2017, which will allow a conclusive assessment of the period in question.

Results:

In the self-assessments, most business partners rate the benefit as medium to high. However, one third do not see any benefit. Business partners rate the benefit lower than research partners. As expected, business partners whose projects were abandoned or not pursued rate the benefit lowest (63% negative benefit ratings).

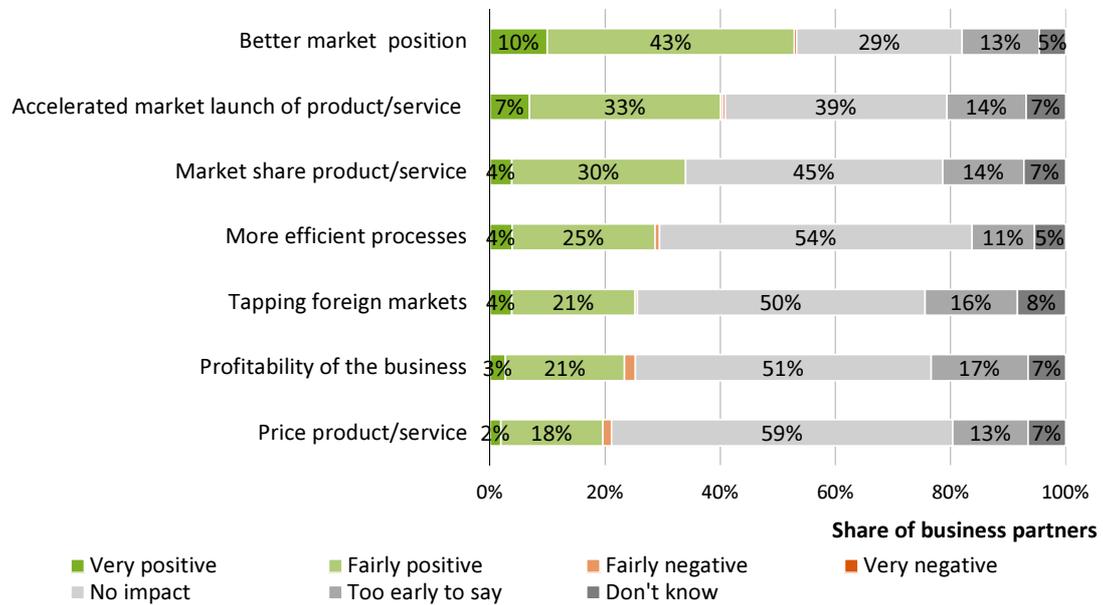
Figure 1: Business partners: project benefit



Question: How would you rate the concrete benefit of the project to your business?

Chart INFRAS. Source: Online survey of business partners in regular R&D project funding (supported projects with project conclusion in 2010-2013, n=270, missing=11), online survey of business partners 2011/12 special measures (2011/12 supported projects, n=149, missing=1).

Figure 2: Business partners: impact on competitiveness



Question: What impact has the funded R&D project had on the following aspects until now?

Chart INFRAS. Source: Online survey of business partners in regular R&D project funding (supported projects with project conclusion 2010-2013), n=258-262, (number of missing responses varied depending on item).

Primary goal of innovation promotion achieved

The results of the econometric analyses show that CTI funding significantly boosted R&D and investment activities in companies compared with the control group of non-funded businesses. We therefore believe the primary goal of innovation promotion has been achieved.

No additional impact (yet) on (innovative) sales

On the other hand, the econometric analysis reveals that the innovation output of the supported companies is not higher than that of the control group, although around half of businesses reckon their sales increased thanks to the project. The fact that there are no additional effects on (innovative) sales can be explained by the following: the CTI supports a disproportionately large number of start-ups, projects with longer innovation development processes and projects that do not always lead to a market launch and more sales, but instead often serve to initiate new projects or generate new ideas. These points suggest that the output of the supported businesses would have been lower if they had not received funding. However, it is also possible that the impact of CTI funding only becomes apparent in the longer term. A clearer evaluation will therefore only be possible when the follow-up is conducted in 2017, which will measure the impact over a longer time period.

Other, less directly measurable effects

Besides the intended effects, a number of business partners mentioned other positive effects generated by projects in the form of gains in expertise and know-how for businesses, new innovation ideas, doors opened to new technology fields, and the benefit of the CTI project as a seal of quality vis-à-vis investors and as a good opportunity to recruit staff.

Impact on research partners

The impact on research partners is gauged on the basis of the self-assessments completed by research partners. The results can be summarised as follows:

Significant benefit from research partners' perspective

According to their own reports, research partners benefit more than business partners. Research partners consider their benefits to be mainly in terms of networking with business partners, strengthening their research priorities and expanding their research activities. It should be noted that these benefits arise in a shorter time for research partners than the economic benefits for business partners. However, research partners also have strong financial motivations to secure third-party funds for their research facility. As expressed in a number of interviews, it is conceivable that at least some supported projects were more driven by the research interests of the research partners than the economic benefits for the business partners.

Applied research

As the R&D project outputs show, research activities are application-oriented, with a high proportion of demonstration units and prototypes. Furthermore, the CTI's R&D projects also make a scientific contribution, e.g. by generating many journal publications. Almost half of projects that received regular R&D project funding resulted in articles in peer-reviewed scientific journals.

Contribution to the employment and advancement of young researchers

Regular R&D project funding also appears to result in a sustainable impact on employment in research institutions. For example, in 39% of projects new staff were hired, of whom around two-thirds are still employed. In at least some cases, the CTI's R&D projects help support young researchers. Besides research assistants, universities also employed PhD students, post-docs and assistants in just under half of projects.

High level of know-how transfer from research to business

According to project partners, the R&D projects have greatly facilitated know-how transfer, predominantly from research to business. One in ten business partners also hired staff from the research partner as a result of the R&D project.

Supporting measures to mitigate the strong Swiss franc (special measures) 2011/12

Concept

The idea of the supporting measures to mitigate the strong Swiss franc (special measures) was to bolster the counter-cyclical behaviour of Swiss companies' innovation activities in an economically weak phase. This policy is based on the economic consideration that it is better for the economy if businesses behave in a counter-cyclical way and conduct more innovation activities in economic downturns, or at least that they do not reduce them.

Due to the particular starting position of the special measures, their focus differs from that of regular R&D research funding. The special measures were all about accelerating projects and reducing the time to market. There was also a certain degree of deadweight loss, i.e. projects were supported that would have materialised anyway, although they may have been delayed.

The special measures faced the challenge of rapidly stimulating demand for funded innovation projects and their implementation. In order to offer appropriate incentives, the CTI relaxed the conditions regarding businesses' own contributions and rates for research partners. In addition, funding was offered to 'market projects', which were already closer to market, alongside the traditional R&D projects. In contrast to regular R&D funding, research institutions could also apply for funding to procure equipment and other infrastructure that was essential for implementation of the R&D project. In order to prevent company disinvestment, projects with increased risk but very high innovation potential were explicitly supported. Finally, applicants could access support measures, such as innovation mentors⁵, funding of patent costs and express procedures.

Implementation

The submission deadline for the special measures was restricted to a two-and-a-half month window in Q4 2011. This short timeframe was a major challenge for the CTI, which required a special effort to cope with the increased workload of the Secretariat and the CTI committee members. In a very short space of time, temporary staff had to be recruited and trained. In addition, the CTI introduced innovation mentors, which have also been involved in R&D project funding since the 2013-2016 ERI funding period.

The special measures met with high demand. The CTI intensively promoted the special measures to the target groups beforehand and sought contact with research institutions and trade associations. A total of 1,050 applications were received, of which the CTI was able to

⁵ This instrument was introduced as a pilot in the special measures and subsequently transferred to regular R&D funding.

process around half. Unlike the regular R&D project funding, funds were awarded on a first come, first served basis.

The CTI committee members assessed the applications in 34 additional evaluation meetings. The same criteria as for regular R&D project funding applied.

In 2012 the CTI approved another 120 projects worth CHF 40 million within the scope of the special measures.

Evaluation of concept and implementation

A conclusive evaluation of the concept and implementation of the special measures was already carried out in 2014 (von Stokar et al. 2014). The results can be briefly summarised as follows:

Concept:

- The evaluation rated the concept of the special measures as appropriate from an innovation policy perspective. The concept built on the CTI's regular and long-standing innovation promotion and was therefore a coherent addition to the Confederation's innovation policy.
- The selected instruments with the special features for market, risk and infrastructure projects were coherently organised given the economic objectives.
- In order to stimulate the relevant demand, the CTI had to offer incentives and make sure they were appropriate. Due to the unexpectedly high response from research and business partners, 519 applications could not even be considered in 2011, which resulted in frustration and inefficiency. With hindsight, the instruments were too attractive given the financial conditions. This applies in particular to the high maximum rate C and the payment of overhead costs.

Implementation:

- The fundamental problem with the special measures lay in the political framework conditions: the choice of timing just before the end of 2011 and therefore the short timeframe in which the special measures had to be designed and implemented was highly unfavourable. This meant the special measures had to be implemented under extreme time pressure, which generated significant extra workload for the CTI Secretariat and committee members. The evaluation shows the CTI implemented them effectively given the circumstances.
- The use of the 'first come, first served' principle was considered necessary by evaluators given the time constraints, but led to frustration among those applicants whose applications

could not be processed. On this point, the CTI could have been taken a more proactive approach to communicating the level of exhausted funds and encouraging applicants to re-apply for funding.

Impact

In relation to the impact of the 2011/12 special measures, the following conclusions can be drawn:

More positive assessment by businesses than for regular R&D project funding

By and large, the results of this follow-up confirm the provisional results of the evaluation conducted in 2014 (von Stokar et al. 2014). According to their own assessments, over three-quarters of business partners describe the projects as useful to their companies. Compared with regular R&D project funding, the evaluation of companies was even more positive, not only in terms of the project benefit, but also in relation to the impact on competitiveness, market position and speed of market launch. By their own account, just under half of companies improved their market position. These results are in line with the expectations of businesses, as expressed within the scope of the first evaluation study.

Primary goal of special measures achieved, but no additionality in output sizes

In the survey conducted as part of the first evaluation study in 2012, more than half of companies stated that they expected a medium-term increase in sales, exports and employment on the back of the R&D project. In the intervening period, the businesses have slightly lowered their expectations.

The economic analyses also revealed that special measures have an impact on input (R&D expenditure) compared with non-supported businesses, but no impact (yet) on output, such as sales and employment. The results on input are in line with the primary aim of the special measures, i.e. to ensure companies do not reduce their R&D activities in economically difficult times. No impact on sales was detected in the first evaluation study. It was assumed that this would emerge over a longer period, but this is not borne out here.

Special measures are successful for stabilisation

Overall, the CTI's special measures can be described as successful, provided their aim was to help stabilise R&D expenditure, which would otherwise be cut as a result of the economic crisis. Businesses tend towards pro-cyclical innovation behaviour, whereby they cut back on innovation in economically difficult times, in particular in cooperation with research institutions.

Research partners consider special measures very beneficial

From today's perspective, the research partners interviewed were much more positive about the benefit of the special measures than in the earlier evaluation. Admittedly, universities hired more temporary staff compared with regular project funding, but 15% of all research partners hired assistants and PhD students as a result of special measures. Despite the original time limitation, just as many new hires were kept on as with regular R&D project funding. For many researchers (23% of projects), the special measures also provided a stepping stone to securing a permanent position with the business partner.

Recommendations

R1. Retain basic concept

The basic concept of the CTI's R&D project funding has proved successful and should be retained. The CTI's specific approach that promotes cooperation between research and business, provides financial support to universities and provides bottom-up funding with no thematic restrictions, is aligned with Switzerland's innovation policy and is well accepted by both stakeholders and research and business partners.

R2. Selectively adjust instruments

The CTI has developed a coherent set of instruments over the past few years. Only selective adjustments are needed: abolition of the CTI Voucher⁶ on the one hand, and strengthening of the innovation cheques, innovation mentors and national thematic networks (NTN) on the other. The innovation cheques play an important role in opening doors for businesses, while the innovation mentors and NTN facilitate access to the CTI and suitable research partners for SMEs and small firms. Furthermore, the CTI should review which instruments (poss. based on the new 'Bridge' project) it could use to close existing gaps between the basic research (of the SNSF) and the applied research of the CTI. Finally, to replace the CTI Voucher, the CTI should review new instruments which would give business partners more of an opportunity to take the lead in innovation projects.

R3. Cooperation with other innovation promotion bodies

The CTI should seek closer cooperation with SECO and other well-established regional organisations, and use them in a targeted way to raise awareness of the CTI among businesses. The evaluation indicates that potential synergies between the CTI and regional innovation promotion are not yet being fully leveraged. While regular exchange takes place between the CTI and SECO, it could be stepped up at cantonal/regional level.

R4. Support more projects that benefit society

Up to now, the CTI has only supported a small number of projects involving innovations that benefit society. The CTI should take steps to better utilise the potential in this area, for example in the important social areas of health, ageing, family, integration and social security.

⁶ The CTI Voucher has already been discontinued in the 2017-2020 ERI period.

R5. Consider earmarking more funds during recessions

This evaluation shows that the 2011/12 special measures perform at least as well as regular R&D project funding with regard to implementation and additionality. In order to counteract disinvestment in economically difficult times, the CTI can earmark more funds for R&D project funding during recessions.

R6. Reduce deadweight loss

The deadweight loss in R&D project funding appears to be rather high. Too many projects would still be realised without funding in the same or another form. The CTI should thoroughly examine how deadweight loss can be minimised, e.g. through more specific checking of potential deadweight loss when assessing applications, or by increasing contributions from businesses (personal contribution, cash contribution).

R7. Enhance project benefits for businesses

The CTI should take steps to increase the benefit of projects for businesses. To this end, the CTI could 1) review whether a change to funding conditions may be appropriate (e.g. higher contributions from businesses); 2) specifically question and critically examine the goals/potential benefits for businesses during the application process; 3) review the benefits for businesses when monitoring projects (milestone meetings) and during the audits after project completion; and 4) record the benefit achieved in a differentiated manner as part of the planned effectiveness monitoring in order to highlight any possible improvements. Finally, the CTI should continue and step up its efforts to motivate and support businesses and connect them with research partners so that more projects are initiated by businesses or jointly with research partners.

R8. Maintain and strengthen communication activities

The CTI is well-known among research facilities and some businesses, but there is still some potential in this area in the business community, particularly among SMEs. In order to introduce SMEs to R&D project funding more effectively, the CTI should expand its current communication efforts and seek to cooperate with regional organisations locally. If demand for project funding rises, the success rate can fall to a certain degree without the CTI becoming less attractive.

R9. Eliminate isolated shortcomings in the assessment process

During this evaluation, criticism was occasionally levelled at the project application assessment process. Although the criticism was isolated and is partly inherent to such processes, the CTI

should review its assessment process, in particular with regard to potential duplication on application forms, communication with applicants and transparent assessment criteria.

R10. Institutionalise standardised impact assessment

The CTI should develop a system that ensures standardised and systematic impact assessment. For this purpose, it should also contractually oblige project partners to participate in regular surveys.