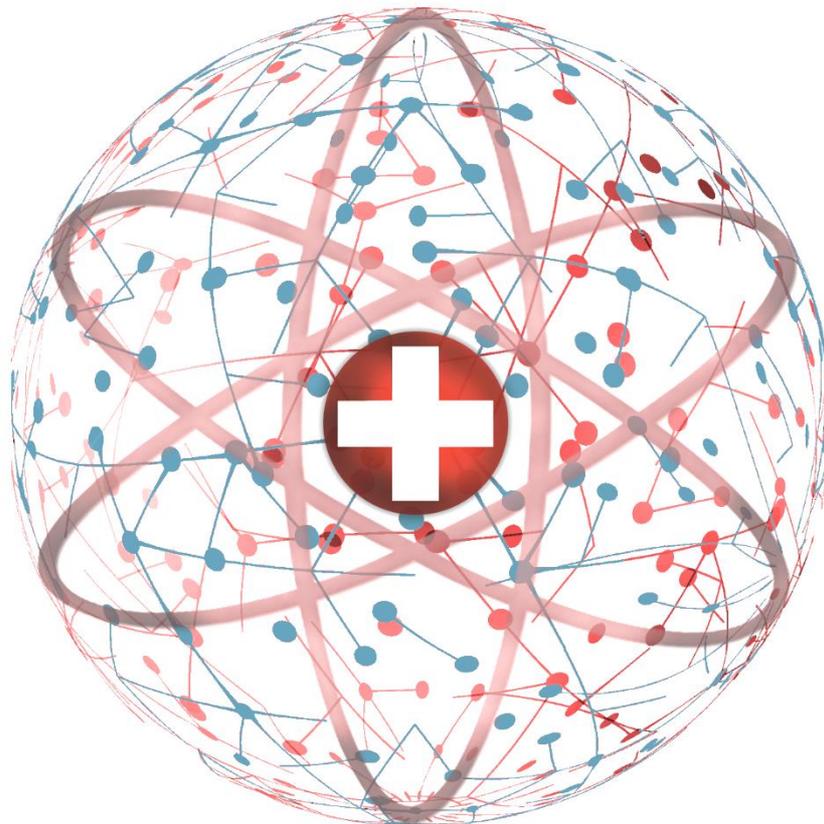

Evaluation of Switzerland's bilateral cooperation programmes in science and technology

Prepared for the State Secretariat for Education, Research and Innovation

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The views expressed in this report are those of the evaluator. They do not necessarily represent those of SERI.

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List of abbreviations

| Abbreviation | Meaning |
|--------------|---|
| AIT | Academia-Industry Training |
| ASEAN | Association of Southeast Asian Nations |
| BRICS | An association of newly advanced economies in the G20 (Brazil, Russia, India, China and South Africa) |
| CIS | Commonwealth of Independent States |
| DAC | Development Assistant Committee of the OECD |
| EPFL | École Polytechnique Fédérale de Lausanne |
| ETHZ | Eidgenössische Technische Hochschule Zürich |
| EU | European Union |
| HEI | Higher Education Institution |
| HES-SO | Haute Ecole Spécialisée de Suisse Occidentale |
| HSG | University of St. Gallen |
| JRP | Joint Research Project |
| LH | Leading House |
| MENA | Middle East and North Africa |
| ODA | Official Development Assistance |
| SERI | State Secretariat for Education, Research and Innovation |
| SNSF | Swiss National Science Foundation |
| Swiss TPH | Swiss Tropical and Public Health Institute |
| UNIBAS | University of Basel |
| UNIGE | University of Geneva |
| UNIL | University of Lausanne |
| UZH | University of Zurich |
| ZHAW | Zürcher Hochschule für Angewandte Wissenschaften |

Executive summary

Background

After a pilot phase in 2004-2007, the Swiss Federal Council introduced bilateral cooperation programmes in science and technology in 2008 in order to foster research cooperation with scientific hotspots outside the EU, North America and Australia.

The key instruments of the bilateral programmes are:

- Small grants supporting pilot activities in research and innovation carried out in cooperation with partners from scientific hotspots. These grants are offered by six Leading Houses (LHs) located at Swiss universities (each covering a specific region) who are also mandated to build new relations with partner countries/regions and coordinate calls for the grants.
- Joint research projects (JRPs) funding bilateral research projects carried out in cooperation with partner funding agencies in eight countries (Argentina, Brazil, China, India, Japan, Russia, South Africa and South Korea) with whom Switzerland has signed bilateral agreements. These larger projects are completed within 3-4 years, and the programme is managed by the Swiss National Science Foundation (SNSF).

It is important to note that the bilateral programmes build on principles of bottom-up implementation and matched funding from partner countries. Thus, the mandates for the management of the programmes are delegated to decentralised operators every four years. In the current mandate period (2017-2020), the total budget of the bilateral programmes is CHF 48.4 million, and approximately 530 grants have been distributed so far.

The first external evaluation of the bilateral programmes was completed in 2011. It concluded that the bilateral research programmes were successful funding instruments and should be continued. Since then, both the context of the programmes and the way in which they can have an impact have changed. First, the internationalisation of research and the need for funding for multinational research cooperation have increased significantly (see Chapter 7). Second, the scope of the LH instruments has grown from selected countries to whole regions covering most of the world outside Europe, North America and Australia. Finally, the programmes have been enlarged and now cover innovation and entrepreneurship activities.

In the light of these developments, SERI mandated IRIS Group in January 2019 to carry out a new external evaluation that would measure impact and relevance and suggest adjustments that might improve the programmes.

The evaluation we report here is based on a number of complementary data sources. They include a survey of applicants and grant recipients, interviews with grant beneficiaries, interviews with programme managers at the LHs and SNSF, and interviews with high-level representative at Swiss universities, as well as bibliometric data. Additionally, programmes in three other countries have been mapped and compared with the Swiss programmes through desk research and interviews with programme managers in these countries.

Short-term effects are convincing

We have mapped outcomes of the granted projects using both survey data and interviews. The evaluation concludes that the programmes are successful in creating value in both research and innovation projects. The main findings are:

- The vast majority of research grants (including both JRPs and the smaller LH grants) deliver scientific output. In all, 85-90% of grants are expected to lead to scientific publications in international journals.
- Almost 70% of the LH-supported projects and 40% of the JRPs have led to, or are expected to lead to, new proposals for larger collaborative projects.
- All participants in the largest innovation programme (Academic-Industry Training) report that they have improved their entrepreneurial skills and developed better business plans and/or business models (including expected results).

Thus, although early research and innovation activities are in general characterised by high levels of risk and inherent uncertainties – not least when they involve long distance coordination – only a few projects disappoint in creating measurable outputs.

High degree of programme additionality, but follow-up funding is an issue

The bilateral programmes play an important role in the Swiss research funding system. Basic funding and a few other (small) SNSF schemes aside, there are no funding alternatives to the LH grants. The JRPs are also unique in the sense that the programme funds projects that are equally supported by Switzerland and a partner country.

In a survey of grant holders, only a small fraction (14%) felt it was likely that they would have been able to initiate their project without support from the bilateral programmes.

On the other hand, the evaluation reveals a weakness in the funding system. Less than half of the LH grant holders surveyed and only a third of the JRP grant beneficiaries totally agree “that good follow-up funding options exist”.

As regards the LH grant holders, the predominantly negative assessment here is due, among other things, to the fact that the JRP programme (which is the natural next level in the funding chain) only covers specific themes and countries. Moreover, JRP calls for each country are only announced once every 3-4 years, and the success rate for applicants is low.

The low level of agreement with the statement among JRP grant holders may be explained by the fact that SNSF only allows 20% of the budget to be allocated to foreign partners in the general research funding schemes. In other countries such as Denmark, Sweden and the UK a higher share is accepted. Thus, the conditions for funding further cooperation through large national research funding schemes are better in other European countries.

The evaluation also shows that 29% of the LH projects and 17% of JRPs have led to follow-up funding, and that a corresponding share of the grant holders surveyed expected to obtain follow-up funding. Thus, a significant proportion of the projects are successful in attracting at least some further funding. However, the rather limited opportunities for follow-up funding in Switzerland may well represent lost value and missed opportunities for translating successful initiation projects into long-term cooperation and larger projects.

Promising signs of long-term impact

The goal of the bilateral programmes is to establish long-term and sustainable partnerships between Swiss researchers and global scientific hotspots. Thus, the expectation is that the research grants are first steps in

the development of strong networks with researchers in these overseas regions (or with partners and potential customers as regards the innovation grants).

Naturally, estimating long-term effects is a difficult exercise that is associated with a high degree of uncertainty, since it takes time to translate small projects into sustainable relations. Nevertheless, the evaluation provides solid evidence of the long-term gains associated with the research and innovation grants distributed under the bilateral programmes:

- Nine out of ten research grant beneficiaries indicate that they have strengthened existing scientific relations with the partner institutions as a result of the grants. And 80% have developed new relations and networks.
- More than 50% of the projects have led to exchanges of students and young researchers *after* the conclusion of the supported projects.
- It is expected that one third of the projects will initiate activities leading to new educational activities developed in collaboration with the foreign partners.
- In all, 40% of the AIT-participants expect their participation in the programme to lead to higher growth in the companies than would have been achieved otherwise.

Another indicator of long-term impact is the extent to which the research grants improve the quality of Swiss research. 85% of grant recipients confirm that the projects have contributed significantly in their field of research. In line with this result, 82% agree to a great, or some, extent that the projects have contributed to more diversified research in their research groups – i.e. research drawing on a broader and more sophisticated knowledge base. These are clear indicators of value creation with long-term impact.

Funding instruments are well designed, but could be harmonised

A key argument for the decentralised LH model is that its inbuilt flexibility allows each LH to design funding instruments that are in sync with research communities and tailored to a geographic region, reflecting that region's distinctive cultural and institutional character.

The evaluation shows that a variety of LH instruments have been developed. In general, they are well designed and deal effectively with barriers to cooperation with scientist and other key actors in the priority regions.

But the evaluation also reveals that the need for tailor-made instruments adapted to the specific character of each region is limited. The barriers to cooperation appear to be quite uniform across priority countries and regions, except as regards their co-funding capacity. Hence, different grant sizes, and disparate criteria and guidelines, for the same types of instrument only complicate the programmes and make them more difficult for the research community to understand.

In addition, two areas of improvement were highlighted by many grant beneficiaries: 1) the timing and number of calls, and 2) the limited range of types of activity that are eligible for funding. The first of these relates primarily to JRPs. The second is mainly an issue for LH instruments.

The evaluation finds that calls for the Swiss JRPs are generally less frequent than calls for comparable bilateral programmes in Sweden, Denmark and the UK.

Sweden and Denmark also only offer one instrument in the early seed phase to explore opportunities for collaboration with countries outside the EU, North America and Australia. The evaluation finds no evidence that the instruments in Sweden and Denmark create less effect than the variety of Swiss LH instruments.

The decentralised Swiss model has more advantages than disadvantages

The decentralised Leading House model, in which providers of bilateral cooperation programmes are spread across the country, is unique to Switzerland. Other European countries follow a centralised model; their programmes to support international research cooperation are managed by central government agencies.

For a number of reasons, we have concluded that the advantages of the LH model clearly outweigh its disadvantages:

- The LH model brings the programmes close to the target groups of researchers and entrepreneurs by mandating general universities and universities of applied sciences (UAS) to design and administer the relevant instruments.
- A decentralised model aligns well with the bottom-up approach of the Swiss research and innovation system, and with the tradition of allowing initiatives for research and innovation derived from individual research teams and companies.
- Existing global networks at the Swiss universities are utilised by allowing universities to act as LHs.
- The model synergises with the internationalisation efforts at the LHs and has strengthened and broadened their existing global networks.
- The mandated LHs build up and professionalise capacity in research grant management which can be harnessed in other areas of grant handling at the universities such as the administration of grants from the universities' basic funding.

On the other hand, the evaluation also identifies disadvantages of the model:

- A decentralised model with several operators requires more resources to be devoted to administration because administrative procedures, templates, and the like, are duplicated
- With separate units it is more difficult to communicate the programmes, and to ensure equal distribution of calls to the target groups, than it is with a centralised operator
- Dialogue with institutions in partner countries can become complicated for LHs when a partner country is used to dealing with government agencies rather than universities.

Despite the disadvantages of the model, the evaluation provides strong evidence that SNSF and all of the LHs have established simple application and grant management procedures that are understood by most applicants, and that the bilateral programmes are in general visible to the target groups.

The evaluator also believes that having the right people in the operating units is the key to success. For a decentralised model to work, the LH teams must be experts in their designated region. They must understand the regional and local agents, networks, programmes and funding opportunities. It is the impression of the evaluator that all operating units have employed very skilled staff with global outlook.

However, most programme participants do not have strong feelings about the operational setup of the bilateral programmes. Applicants regard the programmes as funding opportunities alongside other funding options. But although they do not appear to regard the LHs as regional specialists, it is the perception of the evaluator that grant beneficiaries do benefit indirectly from the strong regional engagement of the LHs.

International research collaboration with BRICS is growing faster in other European countries

In the evaluation, bibliometric data were used to compare the development in international research cooperation in Switzerland with that in seven other European countries. The evaluation compared both growth in research cooperation in general and developments in cooperation with seven selected countries (Brazil, China, India, Japan, Russia, South Africa and South Korea). The main findings are:

- Switzerland experienced high growth in international research cooperation as a whole between 2007 and 2017, and the share of Swiss collaborative publications (i.e. those co-authored with foreign researchers) relative to all scientific publications is significantly higher than can that seen in the benchmark countries (Austria, Denmark, Germany, the Netherlands, Norway, Sweden and the UK).
- In collaborations specifically with the seven selected priority countries, the Swiss performance is more modest. Switzerland is ranked fourth in the benchmark group of eight European countries when its share of all publications co-published with at least one researcher from a priority country is measured.

... and these countries offer bilateral programmes with interesting contrasts with the Swiss bilateral programmes

Further examination of the European benchmark countries reveals that they also offer programmes stimulating research cooperation outside the EU, North America and Australia.

The fact that some countries are experiencing strong growth in their research cooperation with the BRICS countries and other non-European countries does not demonstrate that these countries offer better designed programmes. But it certainly makes it interesting to take a closer look at how international research cooperation is facilitated in these countries. In the evaluation, we looked into programmes in Denmark, Sweden and the UK, and compared them with the Swiss programmes.

The evaluation reveals a number of similarities across the programmes. But it also points to differences, especially in grants funding early-stage research cooperation (the LH grants in Switzerland):

- Only the Swiss programmes require co-funding from partner countries in the seed phase. A written expression of interest is required by the programmes in the compared countries.¹
- Grant limits are approximately the same in Switzerland and Denmark in the seed phase, but programmes in Sweden and the UK allow for larger projects and a longer time frame.
- Proposals in the seed and bridging phases are assessed principally with reference to the exploratory nature of the networks and the development of new networks in the other countries. The Swiss criteria attach most weight to the project idea and its potential.

¹ The arguments are that the ability to co-fund is often limited, and that the responsible councils/agencies have an interest in keeping down the administrative burdens in programmes with low grant sizes.

Recommendations

Overall, the present evaluation of Switzerland's bilateral cooperation programmes in science and technology reveals convincing short-term effects. There are also promising signs that the long-term goal of the programmes – namely, to establish sustainable partnerships between Swiss researchers and global scientific hotspots – will be achieved. However, no lead agency agreements² have yet been established with any of the countries in the scope of the bilateral programmes. It is the impression of the evaluator that the bilateral programmes are an important element in moving closer to the establishment of lead agency agreements. Thus, the evaluator recommends that the bilateral programmes should be continued, as the need to foster collaboration is still evident.

Regarding the governance and design of the programmes, eight recommendations based on the results of the analyses have been formulated by the evaluator. Some of these are specific proposals that could be implemented by SERI, while others are issues to be discussed by SERI and the operators.

The eight recommendations can be arranged under three headlines, as shown in the box below.

Box 1. Overview of recommendations

The LH model and its governance

1. Preserve the decentralised model
2. Clarify the strategic direction of the programmes
3. Consider raising the LH overhead from 8% to 10-12%

Design of instruments

4. Harmonise the research-oriented LH instruments

Communication and administration

5. Use a joint mailing list to ensure equal distribution of calls
6. Improve the SERI website and create an overview of all current and planned calls
7. Improve information and transparency in the LH evaluation procedure
8. Consider monitoring project outcome via a short survey up to one year after the grant period has ended

² Lead agency agreements provide a framework for the joint peer review of proposals by two funding agencies in different countries. One organisation takes the lead in managing the review process with an agreed level of participation by the other, and both agencies accept the outcome of the review process and fund the costs of the successful applications in their respective countries.

1. Preserve the decentralised model

It is our assessment that the advantages of the LH model clearly outweigh its disadvantages. The decentralised model aligns well with the bottom-up approach of the Swiss research and innovation system, and it has a positive impact on the internationalisation efforts of the LHs.

Despite the fact that most applicants do not have strong feelings about the operational setup of the bilateral programmes and rarely regard the LHs as regional experts, programme participants do benefit from the LHs' active role in developing relations and preparing calls with partner regions.

The evaluator recommends that the current decentralised model (with SNSF responsible for JRPs) is preserved.

2. Clarify the strategic direction of the programmes

The evaluation finds that it is unclear to applicants and operators whether the bilateral programmes prioritise in order to foster new relations, or to strengthen existing collaborations in scientific communities – or if both are equally in scope of the programmes. This strategic issue should be discussed within SERI, communicated to the operators and clarified in call documents.

In relation to this issue, the evaluator finds that the aim of developing strong and lasting networks with connections to institutions and researchers in partner countries is not reflected as an explicit evaluation and selection criterion in most call documents. This creates a risk of a bias towards more established networks, less exploratory ideas, and projects with fewer participants. It should be considered whether more emphasis can be put on network building, as this might increase the long-term impact of the programmes.

The evaluation also finds that programmes in other countries give high priority to the development of new networks between researchers who have not cooperated before. Moreover, they emphasise the exploratory nature of the networks.

3. Consider raising the LH overhead from 8% to 10-12%

It is evident from the evaluation that all LHs devote more resources to the administration of the bilateral programmes than can be covered by the overhead provided by SERI. The operators are willing to top-up as an investment in the internationalisation of their institutions. However, most LHs also called for a mature discussion with SERI about coverage of the overhead. The evaluation finds that new LHs mandated for the first time were especially surprised by the workload created by the mandate. The evaluator recommends that the expected workload is described in the contract between SERI and the operators. It should also be considered whether the overhead can be raised from 8% to 10-12%. As the LH model is unique to Switzerland there is no obvious benchmark for overhead rates.

A small overhead increase from the current 8% to 10-12% would not cover all of the administrative costs, and the operators would still need to top-up. However, the evaluator believes that a small increase would be regarded as a recognition of the workload of the LHs, and as compensation for additional tasks related to improved evaluation transparency (see recommendation 7) and the monitoring of projects (see recommendation 8).

4. Harmonise the research-oriented LH instruments

As there is no clear need to develop country/region specific instruments, it should be considered whether the number of research instruments provided by the LHs can be reduced considerably, perhaps even to a single and flexible "Ignition Grant". Such a step would also deal with the need for a more flexible instrument and more frequent calls.

The harmonisation of LH research instruments into a single flexible instrument would help to prevent the bad timing of calls for individual projects and enable researchers to obtain a better overview of the instruments. It would also streamline practice across LHs, as calls, guidelines, templates, etc. could be generalised.

Exchange grants can be smoothly accommodated as part of a flexible ignition grant, and many seed money grants already include exchanges of young researchers. With a single instrument to foster initial collaboration, it is crucial that the range of activities that can be included is wide.

It is important to note that the recommended harmonisation of instruments only includes research instruments offered by the LHs. Innovation instruments should be developed and offered separately, and JRPs should continue to be administered by SNSF through open calls.

5. Use a joint mailing list to ensure equal distribution of calls

Local mailing lists at each LH, together with the SNSF newsletter, are the primary basis on which calls are communicated. Besides local mailing lists, LH calls are distributed by programme managers to contacts at other Swiss research institutions (including other Leading Houses), and the LHs thus rely on their colleagues to redistribute the calls to researchers relevant to the programmes.

Instead of managing individual newsletters and mailing lists for each LH, efforts to coordinate communication should be prioritised. The evaluator recommends using the central SNSF mailing list. Most Swiss researchers subscribe to the SNSF newsletter, and they could choose to subscribe to certain topics or regions. This would create groups of mail recipients, which could then be used by the individual LHs when they are distributing calls.

6. Improve the SERI website and create an overview of all current and planned calls

The landing page of the bilateral programmes at the SERI website contains only a short introduction to the programmes and links to all LH websites. The evaluation suggests SERI's website could be better designed: it could offer more information about the content of key instruments, general rules/guidelines, and the fact that the LHs work in slightly different ways.

A central overview of current and planned calls embedded in the SERI website would also provide a run-down of opportunities for researchers and entrepreneurs. We believe this would be of considerable benefit to potential applicants. Today, applicants need to browse each of the individual LH websites and the SNSF site to obtain an overview of calls.

If the LH instruments are harmonised (see recommendation 4), the SERI website can also provide general guidelines applying to all applicants.

7. Improve information and transparency in the LH evaluation procedure

The evaluation identified a preference, among applicants undergoing the evaluation procedure, for better information and transparency. The preference is particularly clear where LH instruments are concerned and among rejected applicants. Two key actions that could address it are:

- Ensure that fuller information is provided, in the call documents, about the evaluation panel and its strategic and specific criteria for selecting projects.
- Provide more information about the reasons behind (not) selecting individual projects.

In relation to the latter point, there is an opportunity for the Leading Houses to focus more energetically on the potential of rejected project plans. Rejected applicants could be given fuller information about what they would need to do in order to succeed in future call rounds. This might also be an opportunity for the LHs to bring their regional knowledge into play, in guiding the project plans to the next level.

8. Consider monitoring project outcome via a short survey run within a year of the ending of the grant period

Among the operators there is no systematic follow-up on funded projects – apart, that is, from a final report that all projects must submit by the end of the project period. Consequently, no record of project outcomes exists.

In order to systematically track the results, we recommend implementing a short online survey that is automatically distributed to project participants 6-12 months after their project has ended. This would provide clear indication of developments in relation to partner countries and could serve as a steering instrument for the LHs.

Further, the evaluation shows that the arrangements for governance and reporting make it difficult to keep count of activities across LHs. Each LH must assess its own success. A systematic and quantifiable monitoring of project outcomes, in addition to the existing qualitative critical assessment undertaken by the LHs, would provide a strong base for evaluating success.

1. Introduction to the evaluation

1.1 Background

In 2008, following a pilot period running between 2004 and 2007, the Swiss Federal Council introduced bilateral cooperation programmes in science and technology³ in an effort to foster cooperation with non-European countries. The aim of the programmes was to support Swiss scientist in establishing and developing cooperation with scientific hotspots around the world.

Based on the principles of scientific excellence, mutual interest and co-financing, the objectives of the programmes are:

- To encourage the diversification and intensification of international partnerships through the provision of cooperation instruments.
- To help to remove obstacles to cooperation, such as those resulting from differences in funding systems, cultures and language, and from geographical distance.

The first external evaluation of the bilateral programmes was completed in 2011.⁴ It concluded that the programmes were a successful funding instrument and recommended their continuation.

Since then, the content and context of the programmes, as well as the way in which they can have an impact, have changed to some extent:

- In the early years, LHs managed all instruments, including the largest programme, Joint Research Projects (JRP). But in 2013, management of JRPs was delegated to the Swiss National Science Foundation (SNSF), while the Leading Houses continued to manage the smaller funding instruments. The change was made because SNSF (unlike the LHs) is used to manage large research grants. It already had long-term relations with funding bodies abroad and thus was better equipped to launch large bilateral calls.
- During the period 2008-16, the programmes covered the BRICS countries (Brazil, Russia, India, China and South Africa), as well as Japan and South Korea. In the current mandate period (2017-20), the programmes are covering all regions outside the EU, North America and Australia.
- Research systems in the BRICS have undergone substantial changes, and these may have changed the positive conditions for, and barriers to, research cooperation. At the same time, new countries have emerged as promising partners for scientific cooperation.
- A number of research and innovation stakeholders have proceeded with rapid internationalisation. Significantly, the Universities of Applied Sciences (UAS) have increased their international networks and collaboration – indeed two UAS have been appointed as Leading Houses in the current mandate period.

³ The report uses the shorthand “bilateral programmes” for the bilateral cooperation programmes in science and technology.

⁴ Lepori and Dunkel (2011): “Evaluation of the Impact of Swiss Bilateral Research Programs”

- SNSF has merged three existing funding instruments to create Scientific Exchanges – a programme aimed at researchers who want to host their own scientific event in Switzerland, invite colleagues from abroad for a research visit to Switzerland, or visit their colleagues in another country.
- In the current mandate period, more emphasis has been put on cooperation within innovation and entrepreneurship, and this has led to completely new instruments being offered by the Leading Houses.

The principle of supporting collaboration with countries/regions with scientific potential was further confirmed during the recent revision of Switzerland's international strategy for Education, Research and Innovation (ERI).⁵ The strategy now emphasises the changes in the context of international research cooperation and the need for a thorough evaluation of current programmes.

Thus, in view of the changes in the context of international research cooperation and the intention expressed in the updated international strategy, SERI mandated IRIS Group to carry out an evaluation of the relevance and impact of the bilateral programmes, and to suggest relevant adjustments that might improve their performance and impact.

1.2 Evaluation approach

The evaluation was designed as a combined process and impact evaluation.⁶ In this kind of evaluation the purpose is not only to assess the effects and impacts of the programmes. It is also to investigate how, why and under what circumstances the bilateral programmes create effects on research collaboration, innovation activities, and the internationalisation of Swiss universities.

The hypotheses were: 1) that access to bilateral programmes is an important prerequisite for the fostering of research collaboration with universities from non-European countries; and 2) that the Swiss decentralised model – the Leading House model, see Chapter 2 – is an effective way to organise and promote these programmes.

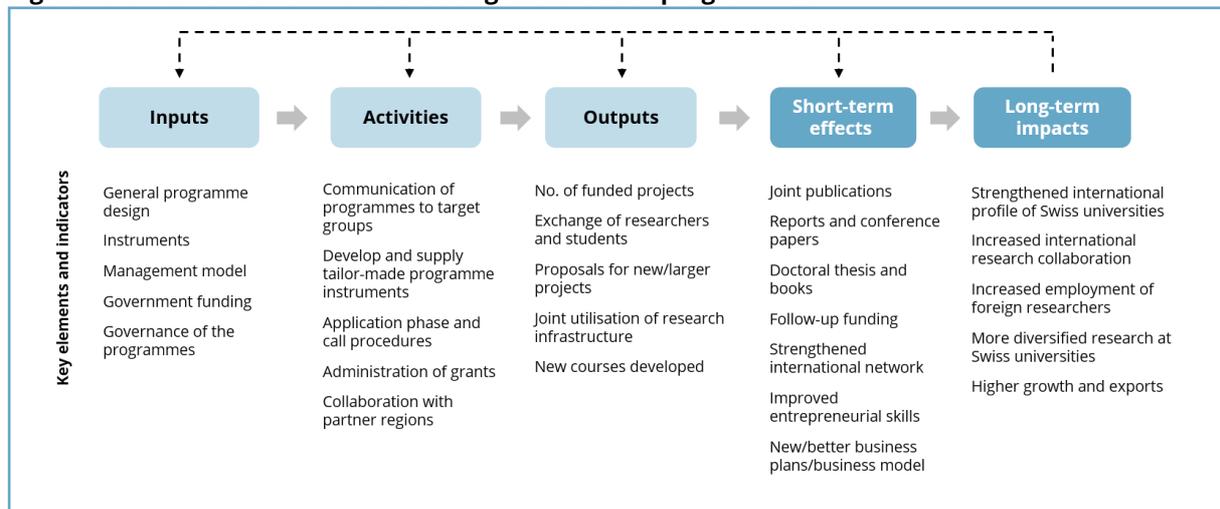
To test these hypotheses, we designed a coherent evaluation framework that was capable of guiding the evaluative activities. The framework deployed an effect chain describing the relations between inputs (such as programme funding), activities and different types of short-term and long-term effects (see Figure 1.1).

The aim of the evaluation was to measure and analyse activities and changes at each stage of the effect chain, and to assess how the effects in the later stages of the chain are related to activities in the first part of the figure. The figure also shows indicators (areas where we have collected data) at each stage of the effect chain.

⁵ Swiss Confederation (2018): "Switzerland's International Strategy on Education, Research and Innovation".

⁶ See, for instance, WHO (2013): "Evaluation Practice Handbook".

Figure 1.1. The framework for evaluating the bilateral programmes



Source: IRIS Group

As can be seen from the figure, **inputs** include the funding of the programmes, as well as the general programme design and how the programmes are managed and monitored by SERI.

Activities comprise the tasks carried out by the programme operators (i.e. the Leading Houses and SNSF) in the course of informing researchers about the programmes, developing instruments targeting the partner regions, creating links to partner regions, and administering calls and grants.

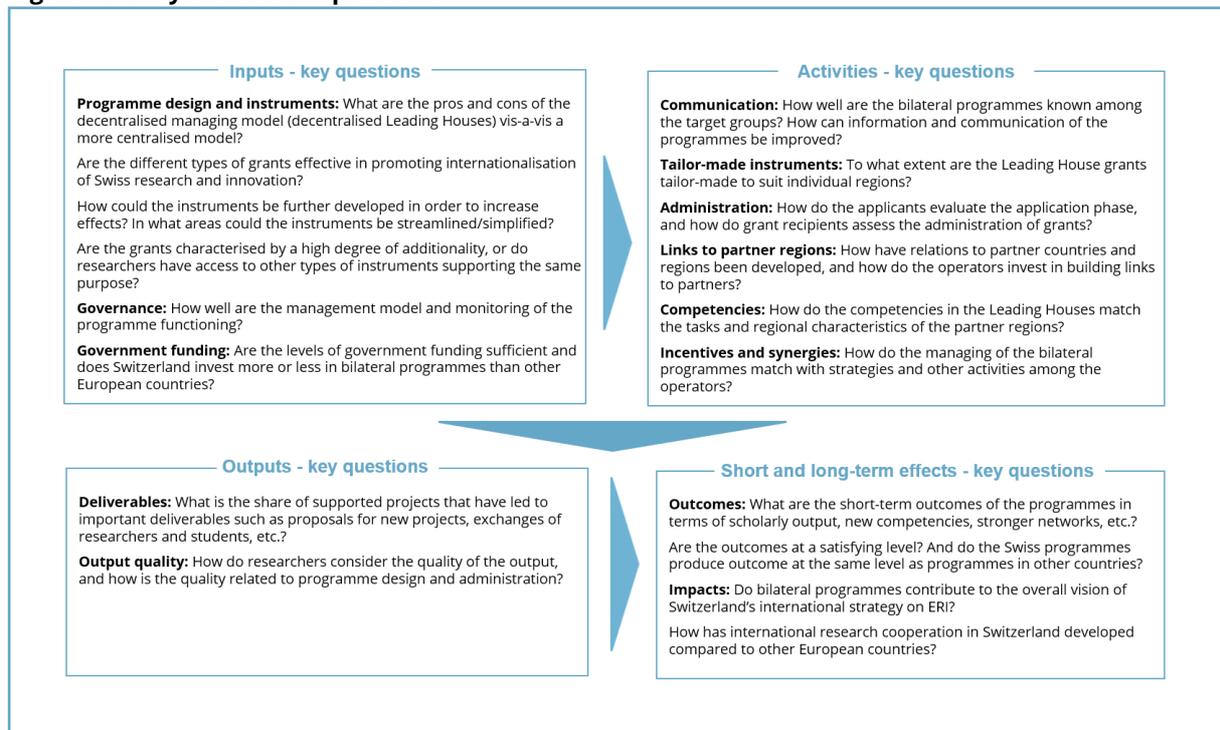
Outputs are the concrete deliverables of the supported projects. They include exchanges of students and faculty members, proposals for larger cooperation projects, courses developed during the projects, etc.

Short-term effects concern the ways in which the cooperation involved in the projects is transformed into measurable outcomes including scholarly outputs, the funding of proposals for larger research projects, and better networks, as well as improved competencies and (in relation to innovation grants) better business plans.

Long-term impacts describe the extent to which short-term effects are translated into more permanent effects. They include increased international competitiveness of both Swiss research and Swiss growth/exports among start-ups taking advantage of the innovation grants.

The evaluation was also guided by a number of key questions about the different parts of the effects chain, and how the elements interact. These questions are shown in the figure below.

Figure 1.2. Key evaluation questions



Source: IRIS Group

The remainder of the report is structured around the five elements in Figure 1.1.

Chapter 2 introduces the bilateral programmes and explains how they are connected to the Swiss International Strategy for Education, Research and Innovation. It also provides an overview of the funding and management of the programmes. Chapter 3 introduces the core instruments of the programmes and evaluates the programme design. It also considers the additionality of the programmes, i.e. the extent to which the projects have alternative funding options. Finally, it discusses the advantages and disadvantages of the decentralised Leading House management model.

Chapter 4 deals with the activity part in Figure 1.1 by evaluating how the bilateral programmes are administered in the Leading Houses and SNSF.

Chapter 5 examines both the outputs (deliverables) of the supported projects and their short-term effects. It reports on the share of projects leading to some specific types of effect for both Leading House instruments and Joint Research Projects.

Chapter 6 examines long-term impacts in terms of 1) cooperative activities that reach beyond the scope of the projects, and 2) expected permanent changes resulting from the programmes.

Using bibliometric data, Chapter 7 investigates developments in international research cooperation in Switzerland and seven other European countries.⁷ Bilateral programmes in three of the countries that are found to perform well (Denmark, Sweden and the UK) are compared with the Swiss bilateral programmes in terms of content, size, etc. The aim is to establish whether the Swiss programmes differ from programmes in

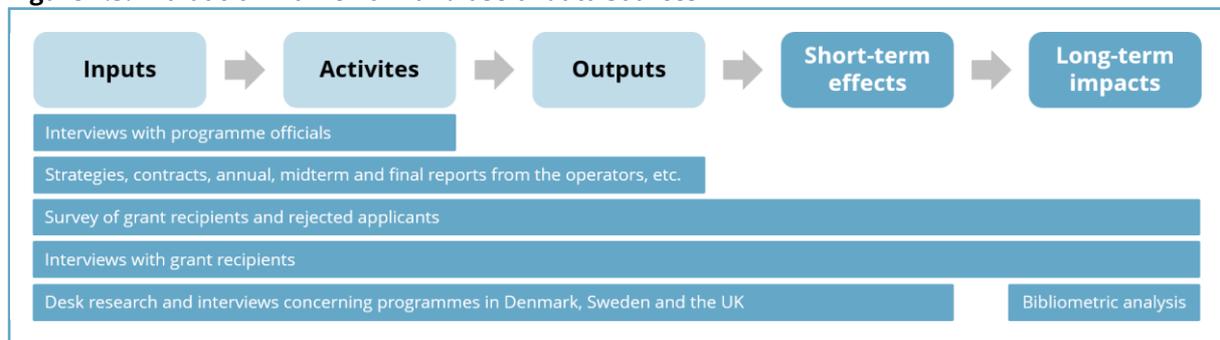
⁷ Bibliometrics is the use of statistical methods to analyse books, articles, and other publications.

other countries, and to ask whether programme design in other countries could guide adjustments in the Swiss programmes in areas where the evaluation is indicative of room for improvement.

1.3 Data

The evaluation builds on six categories of data. The data sources are both qualitative and quantitative, and they involve a number of stakeholders, i.e. high-level university representatives, programme managers, programme administrators, grant recipients and rejected applicants. Different data sources contribute to different parts of the evaluation framework. In Figure 1.3, the data sources are shown under the parts of the framework to which they correspond.⁸

Figure 1.3. Evaluation framework and use of data sources



Source: IRIS Group

As can be seen in the figure, the data sources' applications overlap, i.e. different types of data are used to evaluate the same issues. This reflects 1) an ambition to use qualitative data for more in-depth understanding of the results that emerge from the quantitative data, and 2) a need to combine findings from different data sources in order to draw sound conclusions (methodological triangulation).

Interviews with programme managers and programme administrators

Interviews were carried out with representatives of all current and former Leading Houses, as well as SNSF. We also interviewed two high-level representatives from Swiss universities. We questioned representatives of the swissnex network⁹ in South Africa, China, South Korea and Brazil in order to obtain their input on how the programmes are performing in these countries, and how they contribute to the programmes.

Desk research

Written materials received from SERI such as strategies, contracts, annual, midterm and final reports from the operators, etc. were analysed and used in the evaluation.

Survey of grant recipients and rejected applicants

A survey was distributed to approximately 1,500 valid and unique email addresses for both grant recipients and a sample of rejected applicants. In all 439 persons completed the survey, equating to a response rate of 29%.

⁸ Data sources, including survey details, are described in more detail in Appendix.

⁹ The swissnex network includes swissnex locations and science counsellors in the embassies.

Interviews with grant recipients

26 grant recipients from the period 2008-2018 were selected for in-depth interviews. The interviewees represented the various types of instrument and a range of universities, regions/Leading Houses, grant years, etc.

Bibliometric analysis

We also conducted a bibliometric analysis. This analysis investigates developments in international research cooperation in Switzerland 2007-2017 and compares the situation in Switzerland with increases in international research cooperation in other European countries. It focuses both on developments in research cooperation in general and specific changes in selected priority countries (Brazil, China, India, Japan, South Korea, Russia and South Africa). For the analysis we used the SciVal database, which holds data on more than 12,000 research institutions, covering in excess of 22,000 research journals.

Desk research, and interviews in Denmark, Sweden and the UK

In order to compare the bilateral programmes in Switzerland with those in other countries, we gathered information on comparable programmes and their performance in three other countries. The mapping is based on web research and readings of evaluation reports and call texts, as well as interviews with programme administrators.



ETH Zürich

Leading House for East and South East Asia

2. Bilateral programmes – an introduction

This chapter introduces the bilateral programmes and explains how they relate to the Swiss International Strategy for Education, Research and Innovation. It also contains an introduction to overall programme management in SERI and the funding of the programmes, as well as an overview of the resources devoted to programme administration in the Leading Houses and SNSF.

2.1 The Swiss international research strategy

Switzerland's International Strategy on Education, Research and Innovation (ERI) was approved by the Federal Council in July 2018. It updates the original 2010 strategy. The strategy's goal is to preserve Switzerland's position as a global leader in education, research and innovation. The vision statement is accompanied by two guidelines that outline implementation of the strategy: A) Continuous creation of optimal framework conditions for Swiss ERI actors to freely engage in international activities, and B) Strengthening Switzerland's international attractiveness as one of the world's leading countries in education, research and innovation.¹⁰

The international ERI strategy is supported by a variety of instruments. Switzerland actively participates in the European Research Area. Since 2004, it has participated in the EU framework programmes (FP) for research and innovation, and as a fully associated country it pays a GDP-based flat-rate amount into the overall budget for all FPs and is eligible to compete for funds under the current EUR 80 billion Horizon 2020 framework programme (2014-2020). Equally important is Swiss membership of various leading international research organisations (e.g. CERN, XFEL, ESRF, ESO, EMBL) and the European Space Agency.

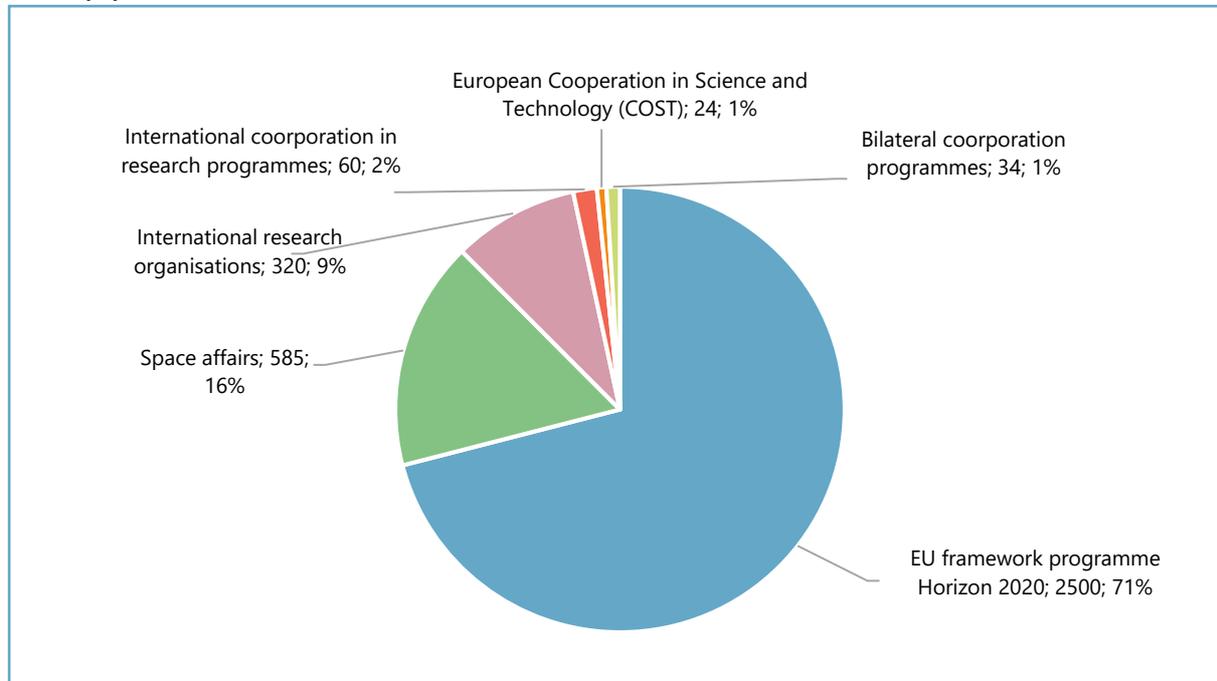
At a national level, the Swiss National Science Foundation (SNSF) offers a range of generic instruments supporting international research collaboration, and the Swiss innovation agency, Innosuisse, supplies instruments to support international innovation activities. Beyond the bilateral programmes, SERI supports a network of scientific counsellors and swissnex. Political actors and relationships in general are supportive of the bilateral dialogue.

In total, CHF 3,523 million has been allocated to the promotion of research and innovation at international level over the period 2017–2020.¹¹ The distribution of funding for international research and innovation activities in Switzerland is shown in Figure 2.1.

¹⁰ Swiss Confederation (2018): "Switzerland's International Strategy on Education, Research and Innovation".

¹¹ SERI (2018): "Swiss Education, Research and Innovation policy for 2017-2020".

Figure 2.1. Promotion of research and innovation at international level 2017-2020 in million CHF and share (%)



Source: SERI (2018): "Swiss Education, Research and Innovation policy for 2017-2020"

Note: Funding of Switzerland's participation in the EU Framework Programme is not part the ERI dispatch 2017-2020 but is outlined in separate dispatches of the same frequency as the Framework Programmes.

Participation in Horizon 2020 absorbs more than 70% of the total allocated budget for the promotion of research and innovation at international level, underlining the importance and integration of European research and innovation cooperation. Between the start of Horizon 2020 and the end of 2017, Switzerland paid CHF 724 million in compulsory contributions to the EU (not including Euratom and ITER). During the same period, Swiss research institutions received EU research funding amounting to CHF 654 million (not including Euratom and ITER) representing an absolute return rate of 0.9. However, the final return and any net inflow or outflow can only be calculated at the end of a programme generation.¹² Around 25% of the budget for the promotion of research and innovation at international level is allocated to space affairs and Swiss memberships of international research organisations, leaving less than 5% of it for smaller programmes fostering international research and innovation collaboration. The bilateral cooperation programmes account for approximately 1% of the budget.

2.2 The bilateral cooperation programmes

Research collaboration with other European countries is well-established, robust and financed primarily under the mantle of the FPs and international research organisations. Links with the US, Canada, Singapore and Australia are also firmly established. However, cooperation with scientific hotspots in other parts of the world is less well established, and the funding options there are more limited. Scientific communities in the BRICS countries continue to develop rapidly, and the changes occurring in these countries have a deep and widespread global impact.

¹² SERI (2018): "Swiss Participation in European Research Framework Programmes"

Internationalisation of ERI activities is an opportunity for Switzerland, but it is attended by barriers such as different funding systems, cultural and linguistic differences, and simple geographical distance. For this reason, the Federal Council launched pilot projects dedicated to supporting bilateral research cooperation with China in 2004 and India in 2005. In 2008, bilateral cooperation programmes covering all the BRICS countries, as well as Japan and South Korea, were rolled out. Today, the bilateral programmes cover all regions outside Europe, apart from the US, Canada, Australia and Singapore (see Figure 2.2). It is important to note, however, that regional coverage as such does not necessarily mean that Switzerland is actively engaged in all of the countries within the regions.

Programmes fostering international research cooperation with non-western countries are not uncommon in European countries (see Chapter 7), but Switzerland was among the first to introduce dedicated bilateral cooperation programmes.

The Swiss bilateral cooperation programmes encourage and support cooperation with countries and regions with strong potential for scientific and technological development. The goal is to establish long-term and sustainable partnerships based on principles of mutual interest in research fields, scientific excellence and matched funding. Thus, bilateral programmes are launched jointly by Switzerland and the corresponding governments of partner countries.

Figure 2.2. Regional foci of the bilateral cooperation programmes (2017-2020)



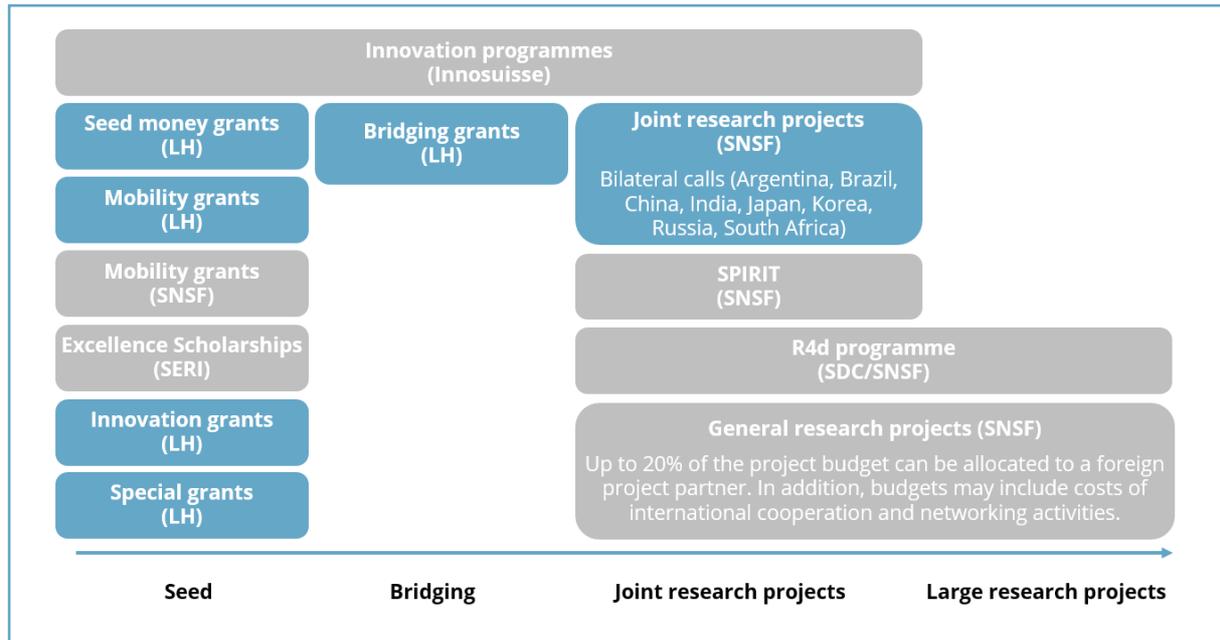
Source: SERI.

Note: Grey areas are not in focus.

The bilateral cooperation programmes are intended to complement existing funding opportunities for Swiss researchers by providing funding for early collaborative activities that can move research from ideas to joint projects.

Figure 2.3 shows the key programmes/grants fostering international cooperation. The programmes are ordered from left to right depending on the focus of their instruments. Programmes providing small grants in the early seed phase to explore and ignite new projects are positioned on the left side of the figure. Those supporting joint, larger scale research projects are on the right. Blue boxes are instruments financed by the bilateral cooperation programmes (see descriptions of instruments in Chapter 3).

Figure 2.3. Key programmes that can be used to finance international research and innovation cooperation with countries outside the EU and North America



Source: Desk research and interviews with programme managers.

Note: LH=Leading House, SNSF=Swiss National Science Foundation, SDC= Swiss Agency for Development and Cooperation

As the figure shows, SNSF and the Swiss innovation agency, Innosuisse, also supply a number of funding instruments besides the bilateral cooperation programmes. Some target specific countries (SPIRIT and R4D), while others can be used to fund cooperation with researchers/universities all over the world. Moreover, SNSF allows up to 20% of its project budget to be allocated to foreign partners in the general research funding programmes.

2.3 Administration and management

The bilateral cooperation programmes are managed by small entities, currently at seven universities (six Leading Houses and one Associate Leading House) and SNSF. The Leading Houses (LHs) are mandated by SERI to cover the six regions shown in Figure 2.2. The choice of LHs is validated by swissuniversities - the umbrella organisation of the Swiss universities. LHs are mandated by a four-year contract to establish relations to funding bodies and develop and provide funding instruments to support ERI activities in their designated region.

In the pilot phase, the two federal universities, ETHZ and EPFL, were mandated as LHs for China (2004-2007) and India (2005-2007), respectively. With the formal introduction of the bilateral programmes in 2008, the scope of the model was broadened to cover South Korea, Japan, South Africa, Russia and exploratory activities in Latin America. The University of Basel and the University of Geneva were appointed as Leading

Houses, while the University of Lausanne, Swiss TPH and University of Zurich became Associated Leading Houses. In the current mandate period (2017-2020), the scope has been broadened to cover whole regions besides the priority countries, and two universities of applied sciences (ZHAW and HES-SO) have become Leading Houses. Additionally, the roles of the two institutions constituting LH Basel have switched: Swiss TPH has become Leading House and the University of Basel the Associated Leading House.¹³

Figure 2.4 provides an overview of Leading House mandates and geographic coverage of the programmes from the pilot phase in 2004 to the current mandate period.

Figure 2.4. Overview of Leading House mandates (associate Leading Houses in brackets), 2004-2020

| | 2004-2007 (pilot phase) | 2008-2012 | 2013-2016 | 2017-2020 |
|---------------------------|----------------------------|---------------------|---------------------|--------------------|
| Priority countries | | | | |
| China | ETHZ | ETHZ | ETHZ | ETHZ |
| India | EPFL | EPFL (UNIL) | EPFL (UNIL) | ZHAW |
| South Korea | | ETHZ (UZH) | ETHZ (UNIGE) | ETHZ |
| Japan | | ETHZ (UZH) | ETHZ (UZH) | ETHZ |
| South Africa | | UNIBAS (Swiss TPH) | UNIBAS (Swiss TPH) | Swiss TPH (UNIBAS) |
| Russia | | UNIGE | UNIGE | UNIGE |
| Brazil | | | EPFL | HSG |
| Regions | | | | |
| ASEAN | | | ETHZ (EPFL) | ETHZ |
| Sub-Saharan Africa | | | UNIBAS (Swiss TPH) | Swiss TPH (UNIBAS) |
| CIS | | | | UNIGE |
| Latin America | | | EPFL | HSG |
| South Asia and Iran | | | | ZHAW |
| MENA | | | | HES-SO |

Source: LH contracts

Until 2013, the bilateral cooperation programmes were managed by the LHs alone. After this, however, the administration and management of the largest research instrument – the Joint Research Projects (JRP: see Chapter 3) – was transferred to SNSF. The purpose of the transfer was to strengthen the communication and administration of this grant (uniformly designed for all regions), coordinate calls and call procedures, and take advantage of SNSF's relations to funding bodies in partner countries and experience in administering large research grants.

In the LHs, programmes are typically organised as projects at offices of international affairs, or similar, with a broad international portfolio of tasks (the University of St. Gallen is an exception to this). Thus, the bilateral programmes represent just one of a number of responsibilities the programme managers have, and in most cases the staff administering the programmes work on the bilateral programmes part-time.

LH staff typically have a background in research administration and/or experience in international research collaboration and knowledge of the specific region being focused on. Thus, many of people in the LH teams

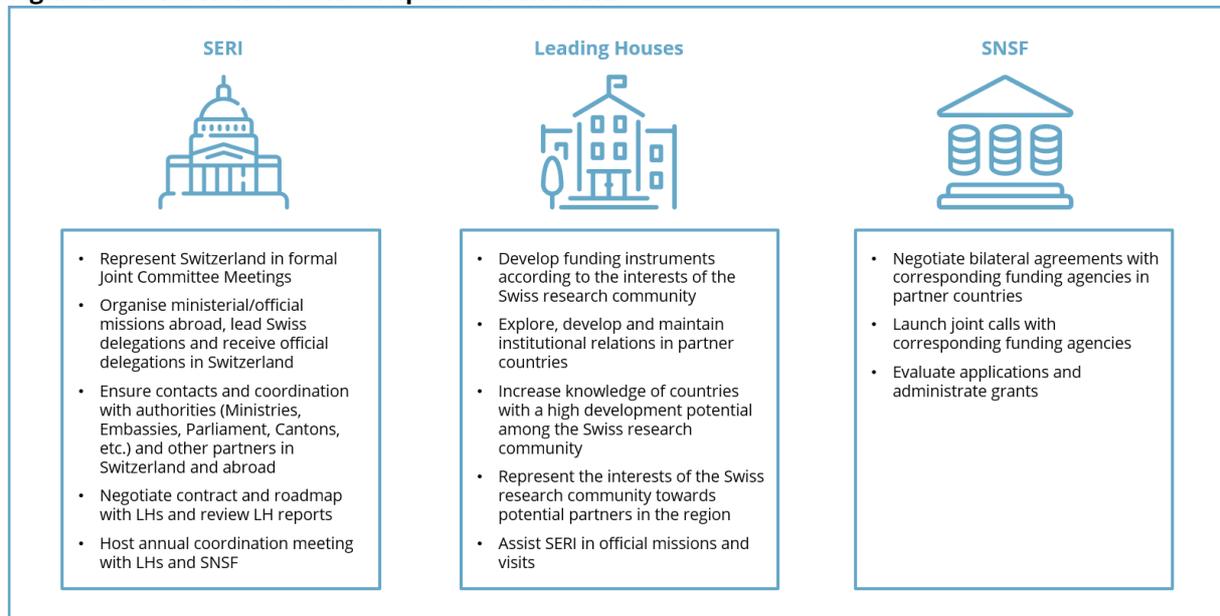
¹³ Both institutions are in Basel. For simplicity, in this report we treat the two institutions as a single Leading House (LH Basel).

have strong connections with some of the countries in the regions and are familiar with cultural patterns in those countries.

Most of the universities mandated as Leading Houses also have strong connections with the regions. For example, ZHAW has approximately 50 partner universities in South and South-East Asia, the University of St. Gallen (HSG) has established a dedicated centre for Latin American Studies, and ETHZ has a branch in Singapore.

Figure 2.5 gives an overview of the tasks connected with a mandate, and the division of labour between SERI, the LHs and SNSF. As can be seen from the figure, a mandate does not only impose an obligation to develop grants and supply calls for proposals. The operators are also required to develop relationships with their partner regions, to participate in Joint Committee meetings, to make bilateral agreements with corresponding funding bodies, and to assist SERI in official missions and visits in and from countries in the partner regions.

Figure 2.5. Overview of tasks of operators and SERI



Source: Desk research

Since the grants and calls are based on the principle of mutual funding, SNSF and the LHs work together with funding bodies in the partner regions to organise and prepare calls. Bilateral programmes are based on bilateral agreements and reciprocity with partner countries. The signed agreements define the principles of collaboration, the priority themes and the funding volume.

2.4 Funding and resources

The bilateral cooperation programmes are funded by SERI. Almost CHF 50 million is allocated to the programmes in the current mandate period (2017-2020). More than two-thirds of this budget is used by SNSF to finance calls for JRPs, while the rest is distributed across the six LHs.

In Table 2.1, budget allocations for 2017-2020 are shown together with numbers of staff allocated to the management and administration of the programmes.

Table 2.1. Budget allocation and staffing resource, 2017-2020

| Institution | Budget (2017-2020) | Number of staff (estimated number of FTE in brackets) |
|---------------------|-----------------------|--|
| SNSF | CHF 34,000,000 | 5 (3 FTE) |
| Swiss TPH* (UNIBAS) | CHF 5,500,000 | 4 (0.9 FTE) |
| ETHZ | CHF 3,500,000 | 3 (1.5 FTE) |
| HSG | CHF 2,000,000 | 3 (0.7 FTE) |
| ZHAW | CHF 1,350,000 | 2 (1.2 FTE) |
| HES-SO | CHF 1,000,000 | 2 (0.7 FTE) |
| UNIGE | CHF 1,000,000 | 2 (0.55 FTE) |
| Total | CHF 48,350,000 | 21 (8.55 FTE) |

Sources: LH and SNSF contracts and interviews with LHs and SNSF

Note: *Swiss TPH receives 2 x CHF 2,000,000 to support two research centres in Tanzania and Côte d'Ivoire (included in the table)

From the budget allocated to each LH, a maximum overhead of 8% can be used to cover indirect costs of programme management (overheads). The overheads can only be offset when the work begins to effectively implement an instrument. In addition, an annual overhead of CHF 10,000 may be deducted from the budget to cover costs of analysis, and advisory and representation activities, carried out by the LHs.

In the transition from the previous mandate period (2013-2016) to the current one (2017-2020), coverage of the LHs overheads was reduced from 12% to 8% of the allocated budget. On the other hand, no additional annual lump sums were available in previous mandate periods.

It is anticipated, although not formally confirmed in the agreements, that the LHs will also make resources available for the administration of the programmes. Thus, the FTE-numbers in the figure do not match the funds that each LH receives from SERI for overheads. Moreover, some LHs state in the interviews that the actual resources they allocate to administration of the programmes are higher than the numbers in the figure indicate. For these LHs, the numbers in the figure are official estimates, and they do not calculate the manpower resource absorbed by the bilateral programmes versus other international tasks.

The obligations of SNSF within the bilateral cooperation programmes are set out in the general performance contract between SERI and SNSF. This contract contains all activities of the foundation agreed between SNSF and SERI for the four-year period (currently 2017-2020). Overhead coverage is not estimated for single instruments but annually for all activities described in the contract.



HES-SO

Leading House for the Middle East and North Africa

3. Evaluation of programme design and management

3.1 Introduction

In this chapter, we evaluate the design and management of the bilateral programmes. The chapter begins with a presentation of the instruments provided by the six LHs and SNSF. It then evaluates the instruments, and assesses their additionality and links with other programmes.

The operation of the decentralised model is then assessed, taking into account the various perspectives of key stakeholders. Finally, the governance and the strategic direction of the programmes are discussed.

The chapter is based on interviews with programme managers at the LHs and SNSF, and consultation with high-level representatives from Swiss universities and Science & Technology counsellors, as well as on survey and interview data from programme participants.

Key conclusions reached in the chapter include:

- The overall programme design allows LHs to tailor their instruments to overcome national, and region-specific, barriers to collaboration. But, as regards research grants offered by the LHs, there has not been a distinct focus on – or indeed a need for – country-specific instruments. Thus, variations in grant sizes, rules and guidelines between LHs only seem to complicate the programmes and make them more difficult for the research community to understand.
- There is a demand for more frequent calls, and, where research-oriented LH instruments are concerned, for more flexible instruments. It should be considered to harmonise existing research-oriented LH instruments into a flexible instrument offered biannually in which, to a large extent, the researcher defines the activities of the project (i.e. open to both exchange, workshops, lab experiments, etc.).
- The LH instruments are characterised by a high degree of additionality. Setting aside the availability of basic university funding and the general mobility grants provided by SNSF, there are no alternative funding opportunities for Swiss researchers who wish to establish initial research activities with peers outside the EU, North America and Australia.
- Follow-up funding options are limited and vary across partner countries/regions. This issue has grown in importance as a result of the enlargement of the LH mandate to cover regions.
- The advantages of the decentralised LH model clearly outweigh its disadvantages. The LH model brings the programmes close to the researchers and thus aligns with the bottom-up approach of the Swiss research and innovation system. The model also synergises with internationalisation efforts being made by the LHs, and it utilises the existing global network of the LHs.
- The governing structure of the LH model, based on flexibility and the freedom to operate, is greatly appreciated by all LHs, and the SERI reporting requirements are perceived as fair. However, communication with SERI can be slow.

Note that Chapter 7 also deals with the issue of programme design by comparing the bilateral programmes with similar programmes in Denmark, Sweden and the UK.

3.2 Funding instruments

A key argument for the decentralised LH model is that its inbuilt flexibility allows each LH to design funding instruments that are in sync with research communities and tailored to a specific geographic region, reflecting that region's cultural and institutional character. Matched funding from partner countries must be established in order to promote engagement and sustainable relationships which build on mutual interest – and which can, in the long term, live on independently of the bilateral programmes.

Since the bilateral cooperation programmes were introduced, a variety of funding instruments have been developed and deployed, with some being phased out by the LHs.

Figure 3.1 provides an overview of the instruments supplied by the six LHs in the current mandate period (2017-2020). Names, grant sizes, rules and guidelines sometimes differ, depending on the LH operating the instrument, but the basic types of instrument shown in the figure are similar.

Figure 3.1. Funding instruments provided by Leading Houses, 2017-2020

| | Instruments | Provided by: |
|-------------------|--|--|
| Research grants | Seed money grants | ETHZ, HES-SO, HSG, LH Basel, UNIGE, ZHAW |
| | Mobility/exchange grants | ETHZ, HES-SO, HSG, LH Basel, ZHAW |
| | Bridging grants/ Research Merger | ETHZ, HSG, ZHAW |
| Innovation grants | Academia-Industry Training (AIT) | ETHZ, HSG, LH Basel, ZHAW |
| | Innovation partnership grants/ Innovation starting grants | ETHZ, HES-SO, UNIGE |
| | Industry internship grants | ETHZ |
| Special grants | Event/opportunity grants | ETHZ, ZHAW |
| | Bilateral research chairs | LH Basel |
| | Programme starter grants | UNIGE |

Source: Desk research and interviews with LHs

As the figure shows, LH instruments fall into three categories: A) Research grants, B) Innovation grants and C) Special grant types. Research grants are by far the largest measured in terms of total funding.

Research grants

The instrument most often provided is the *seed money grant*. This instrument is offered by all LHs. Seed money grants (maximum grant size CHF 10,000–25,000) are intended to initiate joint activities or consolidate existing partnerships. The goal is to support first steps in the development of long-lasting relations and projects by enabling researchers to jointly undertake preliminary research and organise meetings and conferences. In general, seed money grants cover project-related costs, travel, the organisation of workshops, conferences, consumables, accommodation and fieldwork. They are generally not meant to be used to pay for salaries, tuition fees, outsourced services and hardware. However, limited coverage of salary costs for the Swiss partner was noted at two LHs.

All LHs except UNIGE offer *Mobility/exchange grants* (CHF 2,500-10,000). These are to be used to attract young talents to Switzerland, and to encourage Swiss researchers and students to enhance their careers by spending time in an academic environment overseas. Mobility/exchange grants can be spent on travel expenses, accommodation, consumables and fieldwork. They should not be used cover salaries, visa costs, health and private insurance.

Half of LHs provide *bridging grants* (CHF 25,000-50,000) which offer researchers who have already successfully completed a seed project an opportunity to continue joint activities in order to prepare a grant application for a full joint research project (e.g. through SNSF or the EU). Bridging grants or research merger grants can also be used to facilitate the intensification of joint teaching or curriculum development, the maturation of existing projects, or the connection of existing, but separately funded, research projects in Switzerland and the partner country.

Innovation grants

In the current mandate period (2017-2020) greater attention has been given to innovation and entrepreneurial activities as means of fostering bilateral cooperation. All LHs provide at least one innovation-oriented instrument.

The most widely offered instrument (provided by four LHs) is *Academia-Industry Training (AIT)*. This allows researchers to validate an innovative concept through direct contact with business representatives in Switzerland and the partner country. The objective is to enable researchers to gain a better understanding of the potential market viability of their research concept, and thereby allow them to refine the concept accordingly. Other key purposes of the instrument are the development of entrepreneurial skills among the participants, the establishment of contacts with industry, the clarification of intellectual property issues, the facilitation of networking at international level, and the fostering of new partnerships and collaborations. AIT consists of two rigorous weeks – one in Switzerland and one in a partner country. The agenda is packed with investor meetings, industry visits, entrepreneurship workshops, pitch training, incubators and the opportunity to engage with peers. AIT is open to researchers and entrepreneurs with or without a registered company.

Innovation partnerships and *innovation starting grants* promote cooperation between Swiss researchers from academia and innovative companies, start-ups, innovation parks and actors from the socio-economic sector in the partner country.

Alone among the LHs, ETHZ operates an *industry internship* programme encouraging Swiss students to gain work experience in Asia. The aim of the programme is to broaden students' horizons and open their minds to other cultures and ways of doing business.

Special grants

Three of the LHs supply funding instruments very different from those already listed. ETHZ offers *opportunity grants* that support activities linked to specific events or incidents in Asia such as the Olympic Games, international or national Expos, and major environmental or economic developments in the region.

LH Basel supports two *research chairs* (at CHF 50,000 per annum each). One is in environmental and global health (continued from the former mandate period), and one is in migration (revived after a period of inactivity). The objective is to build and strengthen long-term partnerships, in these two fields of research, between researchers in Switzerland and their colleagues in Sub-Saharan Africa. Calls target late-stage PhDs and new postdocs, who are asked to submit proposals for short pilot studies or academic exchanges.

Finally, the University of Geneva provides *programme starter grants* (CHF 10,000-30,000). These aim to increase the number of joint activities between Russian and Swiss institutions – in particular, teaching, summer schools, exchanges and other programmes delivered at undergraduate, graduate and PhD level.

Joint Research Projects (JRP)

As was mentioned in Section 2.3, SNSF has administered and managed the largest instrument in the bilateral programmes, the Joint Research Projects (JRP), since 2013.

SNSF organises and conducts joint calls for research projects in collaboration with funding agencies in Argentina, Brazil, China, India, Japan, Russia, South Africa and South Korea. Successful project applications are jointly supported, with each organisation funding the researchers based in its own country (up to CHF 250,000 (3 years) and CHF 350,000 (4 years) for the Swiss partner). The project grants cover similar costs to those in national SNSF projects (equipment, research funds and salaries), and projects are generally completed within 3-4 years.

Calls are launched on an ad hoc basis every 3-4 years, depending on the region,¹⁴ and may be limited to specific subject areas with relevance in both of the countries involved. In some regions, e.g. South Africa, an active decision has been taken to continue some themes from call to call so that established research relations do not break down. The budgets available for each call depend on the funding available in the partner country (Section 4.4 discusses collaboration with partner regions/countries in more detail).

Proposals for JRPs are reviewed in accordance with international peer review standard procedures, and are jointly organised by SNSF and the corresponding funding agency in the partner country. The peer review experts are designated by the members of an evaluation panel and the administrative offices. These external experts conduct a peer review of the applications using a score system, verifying the scientific quality of proposed JRPs. Evaluation panels are composed of international experts proposed by SNSF and the funding agency in the partner country.

3.3 Evaluation of funding instruments

In this section, we first assess the design and development of LH instruments on the basis of interviews with programme managers. We then set out and discuss proposals for improvement emerging from the survey and interview data from programme participants.

¹⁴ Since 2013, SNSF has announced calls with Argentina (2016), Brazil (2015, 2018), China (2014, 2015, 2019), India (2014, 2018), Japan (2016, 2017, 2018), Korea (2014, 2018), Russia (2015) and South Africa (2013, 2016). See also chapter 5.

From the interviews with programme managers at the LHs it is evident that most instruments have been developed and/or refined by the LHs in dialogue with the target group of researchers. An example is the development of the bridging grant first introduced by ETHZ which was based on feedback from researchers who successfully completed a seed money project but needed a bridge to a full-size research project. Another example is HES-SO. As the LH mandated for the Middle East and North African (MENA) region in 2017, HES-SO initiated a mapping of existing research links to the region and surveyed Swiss researchers about their needs. The main outcome of the mapping was the identification of priority countries.

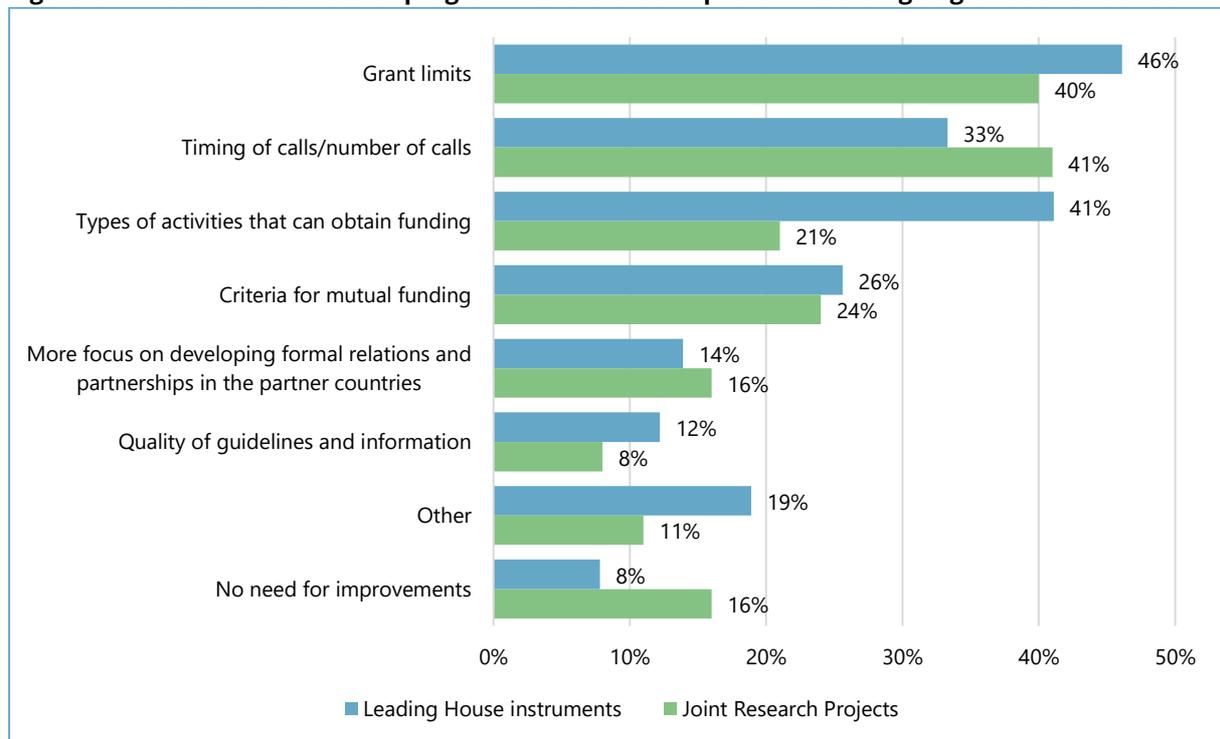
Looking across the six LHs, many similar instruments can be found. When new LHs are appointed, they either inherit instruments from the LHs previously in charge of the same region (e.g. HSG inherited most instruments from EPFL when the mandate changed in 2017) or develop instruments in dialogue with, and inspired by, the catalogue of instruments offered by existing LHs (e.g. HES-SO, as mentioned above).

We find that the overall programme design *does* allow LHs to tailor their instruments to cope with national or region-specific barriers to collaboration. However, our interviews with the LHs show that there has not been a distinct focus on – or indeed need for – country-specific instruments when it comes to the research grants offered by the LHs. The barriers appear to be uniform across countries/regions, except where co-funding capacity is concerned. Thus, during the interviews we did not identify types of instrument, or specific barriers, that separate one region from another.

For this reason, it is argued by both the LHs and programme participants that the existence of different grant sizes, rules and guidelines for similar instruments complicates the programmes and makes them more difficult for the research community to understand. The regional focus of LHs since 2017 further challenges any ambition for specific instruments, because 1) the budget size does not allow LHs to tailor instruments to each of the countries in their designated region, 2) differences within a region could be just as important as differences across regions.

In an online survey, grant beneficiaries were asked to indicate where the bilateral programmes could be improved. In Figure 3.2, the survey results are shown for LH instruments and JRPs.

Figure 3.2. Areas where bilateral programmes could be improved according to grant beneficiaries



Source: Survey of grant applicants. Only beneficiaries are included in this question, and innovation grants are excluded. N=280

Note: Respondents were asked to indicate a maximum of two areas

The figure shows that grant limits are evaluated as the most important area for improvement by the surveyed researchers. Almost half of the respondents (46%) who have received an LH grant state that the size of the grant could be improved (enlarged). Somewhat fewer (40%) JRP recipients point to the grant limit as an area of improvement. In the interviews, the grant limit of the seed money instruments was emphasised especially as a challenge by some researchers. One interviewee said that the seed money grant sits almost between two focuses. It is not a real research grant, as one year is too short and the grant is too small. Nor is it completely suitable as a research starter, however, because options for follow-up funding are often limited (see next below for discussion of follow-up funding).¹⁵

The figure also shows that the timing and cadence of calls are felt to be an area of improvement by 33% of the LH grant holders and 41% of the JRP beneficiaries. According to the applicants interviewed, researchers are often opportunistic and seek to tailor their projects to currently available instruments. However, the survey indicates that researchers do not always find the available instruments adequate at the time of application. LH instruments (e.g. seed money grants for a specific country) are offered once, or in rare cases twice, a year, while calls for JRPs are ad hoc (with at least 2-3 years between calls for individual countries). Thus, there is a demand for more frequent calls and (as regards LH instruments) more flexible instruments.

Flexibility of the LH instruments as regards the types of activities that are eligible for funding could be improved according to 41% of those surveyed. This issue is highlighted by fewer participants in JRPs (21%). The problem mentioned by most of the LH grant beneficiaries interviewed is the restriction on salary coverage. But with LH instruments, this problem merges with another issue: there was a demand for more frequent

¹⁵ Evaluations of research funding instruments based on survey and interviews with programme participants are likely to find that grant limits could be improved. Programme participants would not necessarily provide the same answer if larger grants at the same time resulted in less funded projects and lower success rate.

calls because certain instruments are open to certain activities at certain times of the year. A flexible LH instrument, offered biannually, in which, to a large extent, the researcher defines the activities of the project (i.e. one that is open to both exchanges, workshops, lab experiments, etc.) would address both the issue of cadence and dissatisfaction with the flexibility of calls, and it should be considered.

Finally, criteria for mutual funding need to be discussed, as a quarter of the researchers surveyed point to this as an area of improvement. According to the interviewees, there is often limited funding available in the partner country. Even when in-kind funding is accepted, partner institutions sometimes cannot afford to join bilateral cooperation programmes. On the other hand, the requirement of mutual funding (in-kind funding included) is believed to have a substantial impact on the engagement of the partner countries, according to programme managers and high-level representatives. However, as one high-level representative put it, the differences in GDP among the partner countries are unfair, and consequently requirements on mutual funding should be adjusted from country to country. As we explain in a later chapter, Sweden, Denmark and the UK do not require matched funding in the seed/bridging phases. To overcome the issue of engagement, written commitments from the partner institution are required as part of the application (see Chapter 7).

Additionality and links to other programmes

In evaluating a research programme it is essential to assess the place and role of the programme in the wider research funding system of which it is a part. That is, to examine the additionality of the programme and its links to other programmes. The following examination is based on desk research, and survey and interview data.

Additionality

Looking more widely at research and innovation programmes open to Swiss researchers, we found few alternatives to the funding offered in LH instruments.

Beyond basic university funding and the general mobility grants provided by SNSF and SERI¹⁶, there are no alternative funding opportunities for Swiss researchers who want to establish initial research activities with peers outside the EU and North America.¹⁷

JRPs are also unique in being equally supported by Switzerland and a partner country. But in some cases a project eligible for a JRP grant may also be eligible for funding through the general programmes provided by SNSF.¹⁸

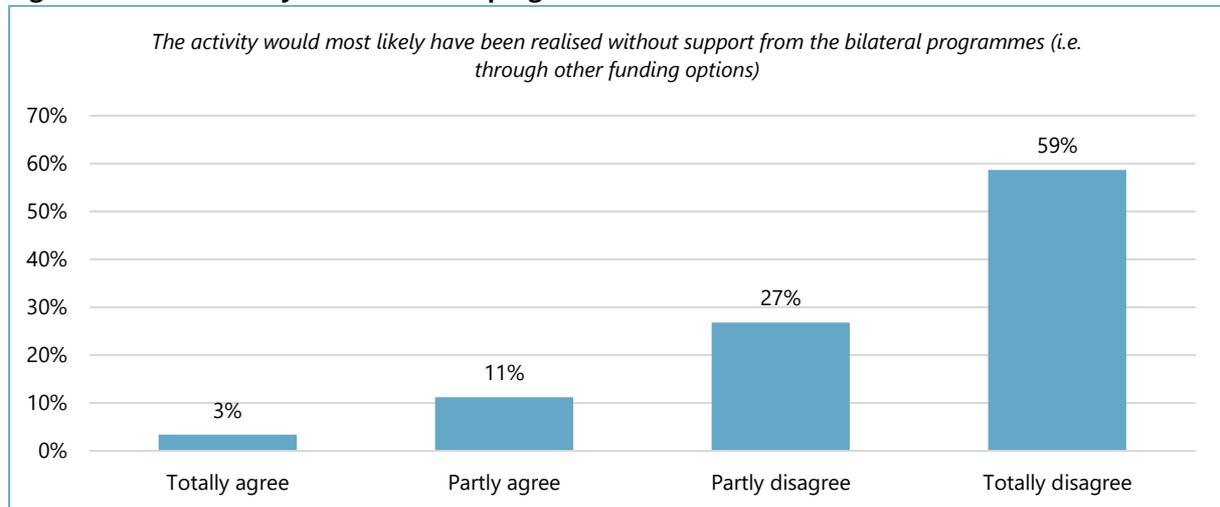
In the survey, we asked grant beneficiaries whether their projects would have been possible without the support of the bilateral programmes. The results are shown in Figure 3.3. LH instruments and JRPs are combined in the figure, as there is no significant difference between the answers relating to each instrument.

¹⁶ SNSF provides career funding schemes including fellowships for Swiss researchers who wish to enhance their scientific profile by working at a research institution abroad. SERI administrates the Government Excellence Scholarships aimed at young researchers from abroad who are planning to come to Switzerland to pursue research or further studies.

¹⁷ In Lepori and Dunkel (2011): "Evaluation of the Impact of Swiss Bilateral Research Programs" the authors reach the same conclusion, stating that the bilateral programmes covered a specific niche in the Swiss research funding landscape where there were very few funding opportunities.

¹⁸ Since 2016, it has been possible to allocate up to 20% of the budget in SNSF general research programmes to a partner abroad (higher than the percentage in mere subcontracting but lower than that in JRPs).

Figure 3.3. Additionality of the bilateral programmes



Source: Survey of grant applicants. Only beneficiaries are included in this question. N=295

Note: The responses "Don't know" and "Not relevant" are excluded from total

It can be seen that the vast majority of the researchers surveyed do not believe that their projects would have been realised without funding from the bilateral cooperation programmes.

A deeper analysis shows that the additionality of the instruments is recognised particularly by young recipients of an LH grant. Only 10% of the post docs, PhDs and master's students *totally agree* or *partly agree* that their activities would have been realised in the absence of the grant. For senior researchers in receipt of an LH grant the figure is 16%.

In fact, only a few of the grant holders we interviewed knew of alternative funding options available for the types of activities supported by the bilateral programmes. Some beneficiaries of JRPs mentioned EU grants as an alternative way of funding international research projects. However, EU projects are often multilateral and larger in scale. They are more likely to be considered as an option for follow-up funding.

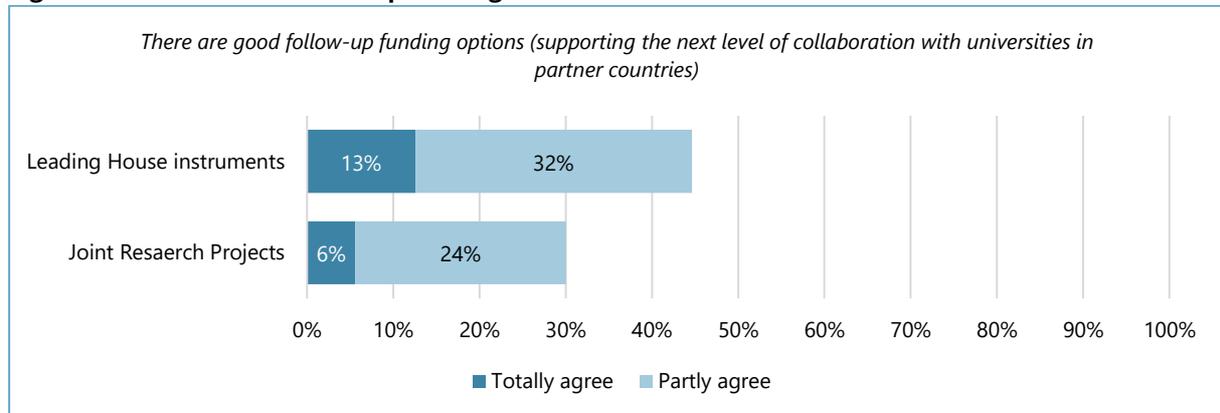
Innovation grants are offered less often than research instruments in the LH portfolio. But the few interviews we conducted with innovation grant beneficiaries suggested that the innovation-oriented instruments provided by LHs fill a gap for "scientrepreneurs" wishing to test the commercial potential of their research and learn about life as an entrepreneur before considering fully-fledged entrepreneurship.

Follow-up funding

The evaluation also finds that follow-up funding options are limited and vary from one partner country/region to another.

In the survey, grant beneficiaries were asked about the existence of follow-up funding supporting the next level of their collaboration activities. Figure 3.4 shows the responses for research-oriented LH instruments and JRPs.

Figure 3.4. Existence of follow-up funding



Source: Survey of grant applicants. Only beneficiaries are included in this question, and innovation grants are excluded. N=249

Note: The responses "Partly disagree" and "Totally disagree" are not shown, and "Don't know" and "Not relevant" are excluded from total

As the figure shows, only a small fraction of the LH grant recipients, and an even smaller share of JRP grant recipients, totally agree that good follow-up funding options exist.

Depending on the stage their collaboration had reached, the researchers we interviewed reported different needs for follow-up funding. Some projects were still at an early stage after earning a seed money grant, while others had developed ideas and consolidated their initial results, paving the way for a larger joint research project. However, far from all of the larger joint research projects were initiated with an LH grant. Some collaborations had started with a JRP received directly from SNSF.

Figure 3.4 reveals that more than half of the researchers with an LH grant do not regard their options for follow-up funding as promising. An important reason for this, according to the interviewees, is that the JRPs only cover eight priority countries, and calls are announced every 2-4 years. Furthermore, call themes and eligible scientific fields are negotiated between SNSF and the corresponding funding body in the partner country, which effectively narrows the window for eligible applicants. In addition, success rates are often low because the matching funding available in the partner country is limited.

The issue of a lack of available follow-up funding options has grown in importance with the enlargement of the LH mandate to cover regions. When new countries are explored, next-step funding is not always available. In the interviews with programme managers it is clear that coordination between the LHs and SNSF in terms of planning calls with this issue in mind can be limited. This can create situations where high-potential research collaboration is significantly impeded or dropped.

The management at SNSF, and also some of the interviewed researchers, mentioned that the new SPIRIT programme, launched by SNSF in 2019 (see Box 3.1 below), had improved follow-up funding options. But it is too early to evaluate whether SPIRIT is capable of filling the funding gap experienced by many researchers working with colleagues outside the EU and North America.

Finally, the bridging grants should be mentioned. These are popular because there is often a need for further workshop activities, travel for meetings, and so on, in order to develop plans and prepare applications for larger projects. Bridging grants are provided by half of the LHs, but for the remaining regions a lack of bridging grants can constitute a gap.

To sum up, we find that the LH instruments enjoy a high degree of additionality. Typically, they do not create substantial impact alone, but they are important igniters that can lead to larger joint research projects.

Many grant beneficiaries see seed money grants as an important basis on which to develop results that can be used in applications for larger projects. However, the lack of follow-up funding options implies lost value and missed opportunities to build on a successful first collaboration.

Box 3.1. SPIRIT

The Swiss Programme for International Research by Scientific Investigation Teams (SPIRIT) facilitates knowledge exchange between Swiss researchers and colleagues in selected countries who are receiving development assistance. The programme covers 127 eligible partner countries. The eight countries participating in a bilateral call with SNSF are not eligible as partner countries. The programme is open to all fields of research, and applicants can request CHF 50,000–500,000 in project funds for 2–4 years. Pre-proposals can be submitted all year round, and full proposals only by invitation after approval of the pre-proposal. The programme operates with a “come when you are ready” approach, which means that rejected applicants have two years of quarantine before they can apply again.

Source: SNSF website and interview with SNSF

3.4 Operation of the decentralised model

The bilateral cooperation programmes are funded at the federal level by SERI but managed by six Leading Houses and SNSF. This decentralised model, with the providers of bilateral cooperation programmes spread across the country, is unique to Switzerland. Most other European countries follow a centralised model in which programmes to support international research cooperation are managed by a single funding agency (a sister organisation to SNSF) or government agency (see Chapter 7 for a comparison of bilateral collaboration programmes in selected European countries).

In this section, we attempt to map the advantages and disadvantages of decentralisation, drawing on input from interviews with programme managers (at the LHs and SNSF) and programme participants, as well as high-level strategic representatives at the universities. The views of each group are presented separately and then summarised in table setting out the main advantages and disadvantages of decentralisation.

Programme managers

All of the LH programme managers support the decentralised structure. They point to the close ties between the universities and the research communities as a great advantage of the LH model. At the LHs, it is argued that central government agencies are not as close to the target group of researchers and entrepreneurs as the universities. The LH teams are regularly in dialogue with the target group and develop their instruments in a way that is sensitive to feedback and the demands of the researchers and entrepreneurs.

Decentralisation secures close ties to the research communities and their representatives, and it provides the flexibility to design instruments to meet distinctive characteristics of a specific region.

Another advantage of the LH model raised by most programme managers rests on the strong global networks in which the universities are positioned. The regional links of the universities are valuable in that they facilitate achievement of the aims of bilateral programmes. Personal relations in universities, ministries and funding agencies abroad are deemed very important in the successful establishment of bilateral cooperation. All LHs are strongly involved in their designated regions, and most were engaged with regional research communities prior to their mandate (see Chapter 2). The LHs invest in their relations, and in most cases they have been successful in establishing robust cooperation.

Notwithstanding the general support for the decentralised model, one disadvantage was mentioned by all LH teams: the duplication of administrative procedures. All LHs must establish their own operational procedures, formulate and communicate calls, evaluate applications, and manage enquiries from participants and prospective applicants. Consequently, a variety of systems, workflows and templates for calls and reporting, etc. are employed by the LHs.

The administrative burdens were referred to more often by the younger LHs. Over time, the older LHs had developed procedures and templates which they reused.

The evaluation of applications is highlighted as a particularly time-consuming task by most LHs. Concerns about the possibility of bias mean that external reviewers are invited to evaluate applications. Each LH must therefore identify suitable reviewers. Although the LHs often help each other (by reviewing applications received by other LHs), the review process is a time-consuming task which – as the programme managers acknowledge – could probably be more efficiently managed by a central funding agency.

The former LH for India and Brazil, EPFL, and its associate LH, UNIL,¹⁹ were found to be the most sceptical about the decentralised model. They supported the aim of the bilateral programmes, but they also felt that decentralisation, with all of the information, templates, lessons and experiences duplicated across six LHs, is too resource heavy. The current LHs agree that the mandate is demanding in terms of time spent on management, but on balance they conclude that the investment is justified by the value added to the universities' internationalisation efforts.

According to some LHs, dialogue with institutions in partner countries of the kind the decentralised model relies on can also be challenging. Although most LHs have an established network in their designated region, dialogue with partner countries is not always easy. The fact that a university is mandated to fund research on behalf of a government body can be difficult to explain to ministries and funding agencies in the partner countries. Some agencies are reluctant to cooperate with universities on the development of formal partnerships and contracts. In one case (India), a letter from SERI explaining the model was necessary for the negotiations to continue.

The programme manager at SNSF also supports the decentralised setup, but the importance of the right balance in programmes administered by the LHs and SNSF was also emphasised during this interview. As SNSF funds large basic research projects, the transfer of the largest bilateral research instruments (Joint Research Projects) from the LHs to SNSF is acknowledged. But SNSF is not geared for, nor interested, in the administration of small grants, and it argues that the universities are in a better position to facilitate the first steps of bilateral cooperation with small grants.

Programme participants

Few of the interviewed grant recipients had strong feelings about the operational setup of the bilateral programmes. The vast majority of researchers regard the programmes as funding opportunities that should be compared with other funding options. Some researchers participating in a bilateral project for the first time described the model as odd and said they had to figure out the role of the LH before making their application.

LHs were not regarded as regional specialists by most of the programme participants we interviewed, who explained that dialogue with the LHs was limited to practical information, application procedures, etc.

¹⁹ EPFL was mandated Leading House from 2005-2016 but did not want to continue into the current mandate period (2017-2020). UNIL was associate Leading House to EPFL from 2008-2016.

However, as we explain in the next chapter, grant recipients are very satisfied overall with the administration of the bilateral programmes by the LHs and SNSF. This suggests that the small, decentralised administrative units are able to deliver the same quality of programme administration as central funding agencies.

High-level strategic representatives

Two interviews with high-level representatives from Swiss universities provided a strategic perspective on the bilateral programmes and the operation of the decentralised model.

Both representatives emphasised that the Swiss research and innovation system relies strongly on a bottom-up approach as a general principle, and that initiatives for research and innovation should derive from individual research teams or firms. For this reason, they saw the decentralised model for fostering bilateral research and innovation activities as natural, because it is close to the research communities.

From a strategic point of view, the bilateral programmes are an integral part of the universities' internationalisation efforts. There is a strong synergy between the programmes and other international tasks within the universities, reflected in the fact that LHs are often located in universities' international offices, and that the LH staff blend with other international employees.

It was acknowledged that decentralisation, with several agents, requires more resources and can make communication harder than it is when a centralised, uniform funding agency is involved. The representatives also stressed that having the right people in the LHs is key to their success. For decentralisation to work, the LH teams must be experts in their designated regions – they must understand the regional and local agents, networks, programmes and funding opportunities.

Programme participants may not regard the LHs as regional specialists. However, both of the high-level representatives emphasised that grant recipients indirectly benefit from the strong regional engagement of the LHs (i.e. contacts at universities, embassies and funding bodies abroad).

Another advantage mentioned was training in grant management. Not all LHs were experienced in managing research grants prior to their mandate in the bilateral programmes. For inexperienced LHs, the LH mandate has built up a new capacity within the administrative unit at the university. Within experienced LHs, grant management has been further professionalised.

Finally, the mandating of two universities of applied sciences (UAS), ZHAW and HES-SO, from 2017 is believed to have increased the visibility, and thus general awareness, of the bilateral programmes in research environments of applied science. It is recognised that UAS participation in bilateral programmes has increased over the last few years.

Advantages and disadvantages

The main advantages and disadvantages of the decentralised model, as seen from the three points of view we have gone through above, are summed up in the table below.

Table 3.1. Advantages and disadvantages of the decentralised model

| Advantages | Disadvantages |
|--|--|
| Close to target group | Administrative/resource heavy |
| Utilisation of existing global network at LHs | Difficult to communicate with target group |
| Synergy with internationalisation efforts at LHs | Dialogue with institutions in partner countries can be difficult |

| | |
|---|--|
| Aligned with the bottom-up approach of the Swiss research and innovation system | |
| Training in grant management | |

It is our assessment that the advantages here clearly outcompete the disadvantages – especially since the disadvantages are not too challenging to deal with as such. Moreover, the two disadvantages listed first (in resource use and communication) can be reduced by implementing the recommendations we set out in Chapter 1.

3.5 Governance

In this Section, the governance of the bilateral programmes is evaluated with reference to desk research and interviews with programme managers.

Contract and obligations

The LHs and SNSF are mandated for four-year periods. Strategic goals and obligations are outlined in a contract between SERI and each LH. The contract with SERI states three strategic goals: 1) Further development of research cooperation between Switzerland and countries with a high development potential in the designated region, with funding instruments designed in accordance with the interests of the Swiss research community. 2) Improving the Swiss research community's knowledge of countries with a high development potential through the availability of contacts and know-how. 3) Representation of the interests of the Swiss research community vis-à-vis potential partners in the region.

In addition to the contract, a roadmap for bilateral cooperation in the designated region of each LH is drafted in a joint effort by SERI, the LH in question, SNSF and swissnex network. The roadmap provides a general overview of the region in focus and outlines challenges of collaboration. Based on the roadmap, an action plan is negotiated between SERI and each LH. The action plan lists the instruments, events and other activities that the LH intends to deploy in the mandate period.

Goals and negotiated actions are qualitatively described. None of the three documents (contract, roadmap, action plan) formulates quantifiable performance indicators. LHs are required to draft an annual, a mid-term and a final report for SERI in which areas of progress are outlined with reference to the action plan. There is no uniform template for reporting. LHs are required to describe some specific themes and attach a budget, but besides that each LH has the freedom to report in its own way. Thus, reporting to SERI also gives the LHs an opportunity to introduce ideas for new instruments, change existing instruments, and alter the scheduled calls or make other changes that are expected to improve the programmes.

From the round of interviews with programme managers, it is clear that their flexibility and freedom to operate are greatly appreciated by all of the LHs. Equally, the reporting requirements from SERI are perceived as fair. However, it appears that the governance and reporting structure make it difficult to keep count of activities across LHs, and each LH must assess its own success. The three strategic goals stated in the contract between SERI and each LH are broad and can be pursued in many ways. Such goals are not suitable as strict Key Performance Indicators. Thus, the critical assessment of success that each LH is asked to provide in the final report seems to represent a reasonable approach. In our view, moreover, that the LH reporting is transparent and honest.

Coordination and communication

SERI arranges an annual meeting that includes all LHs and SNSF. The purpose is to discuss issues noted in the annual reports and coordinate actions between the operators. All programme managers consider the meetings important, but SNSF and some LHs think that more communication is necessary during the year in order to coordinate and schedule calls. On the other hand, other LHs find the annual meeting sufficient and argue that it would be difficult to devote more resources to meetings and travelling.

Besides the annual meeting, coordination between LHs takes place via relations and personal contacts. Mutual learning points are exchanged, good practice is passed on to younger LHs, and the LHs help each other with the evaluation of applications.

Communication with SERI is regarded as smooth and informal, but it can be rather slow according to the LHs. SERI is open to new ideas and fresh types of instruments, but it is not unusual for the LHs to wait 1-2 months for SERI to review and respond to filed reports. Several LHs emphasised that the approval processes of the mandate to LHs from one period to the next were too slow. In 2012, and again in 2016, this lack of speed resulted in delayed operation, and in a gap with no calls and no security for the continuation of the mandate for almost a year.

Finally, collaboration with the swissnex network and with science counsellors at the Swiss embassies seems to be very fruitful for all parties. According to the LHs, science counsellors have been of great help in establishing networks and relations – both in countries new to bilateral scientific cooperation with Switzerland and in cases where staff, or management, in partner institutions have been replaced and new personal relationships must be built. Representatives from the swissnex network contribute a great deal to the operation of AIT programmes, and their efforts are evaluated very positively by the LHs.

Across the operators (LHs and SNSF) and the researchers, the shift in administration of JRPs from LHs to SNSF is praised. The JRPs were too large for the LHs to manage. Since SNSF took over in 2013, administration has improved, according to the programme participants. As was mentioned in Section 2.3, SNSF has incorporated the JRPs into the general SNSF framework and aligned the instrument with other SNSF instruments that are familiar to most Swiss researchers. Operators agree that the division of tasks between the LHs and SNSF seems balanced and in accordance with each operators' main competencies.

Strategic direction

The SERI mandate does not state whether the LH grants should prioritise the fostering of new relations or the strengthening of existing collaborations in scientific communities – or whether both are equally in scope within the bilateral programmes (see also Chapter 7). As a consequence of this omission, both LHs and researchers interested in bilateral cooperation report that they are unsure about this strategic issue.

Regarding JRPs, SNSF is often asked whether or not it is an advantage to have established relations in the partner country. The answer provided by SNSF is that it is the scientific quality of a proposal that is given most weight. It is not a disadvantage to build on established partnerships, nor is it a plus, however. SNSF's approach might also be the solution for the LHs, but the issue should be discussed with SERI and the determined preference should be clear in all call documents.

Since 2017, the scope of the bilateral programmes has been broadened to cover whole regions in contrast with single priority countries. The strategy is ambitious, but the LHs' role in the cultivation of relations in the regions should be discussed, as they cannot and should not prioritise relations in all countries in one mandate period. It could be made more explicit *how* the LHs are expected to develop relations with newcomers, and whether they should focus their limited resources on a couple of countries in each mandate period.



University of St. Gallen

Leading House for the Latin American Region

4. Evaluation of programme administration

In this chapter, we evaluate the administration of the bilateral programmes at the level of the operators (LHs and SNSF). First, communication, visibility and access to the programmes are assessed. Then the process for evaluating proposals is analysed. This is followed by an evaluation of how awarded grants are administered by the operators. Finally, the collaboration of operators with partner regions/countries is discussed.

The chapter is based on survey and interview data from grant recipients/applicants, interviews with programme managers at LHs and SNSF, and interviews with Science & Technology counsellors.

The main results can be summarised as follows:

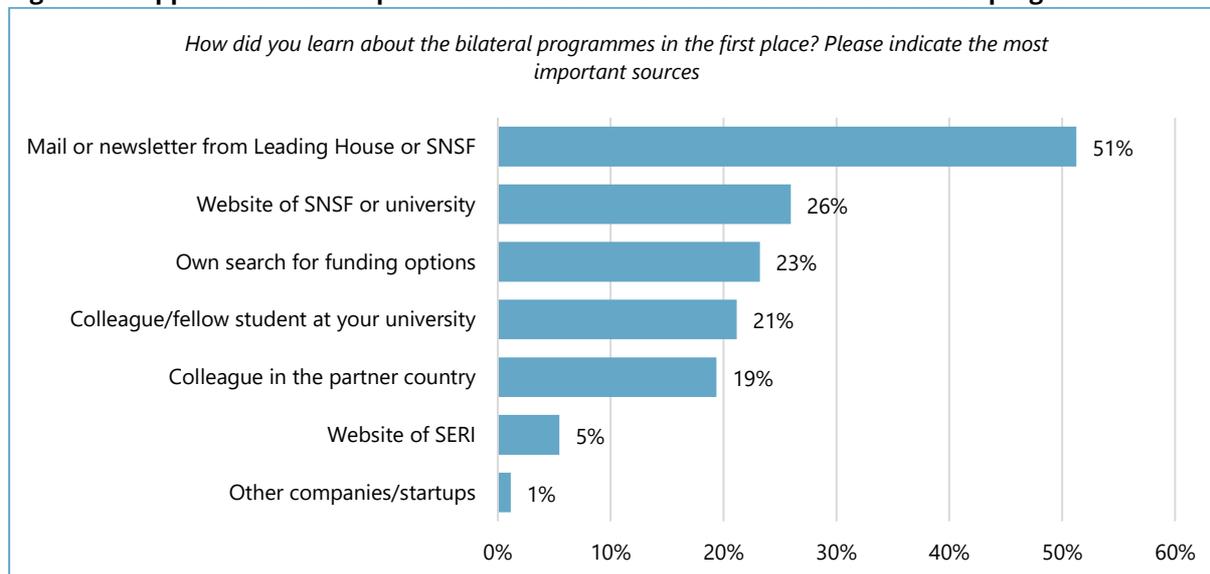
- The bilateral programmes are in general considered visible to the target groups. Transfer of the JRP from the LHs to SNSF is believed to have eased access to the instrument.
- Mail and newsletters from the LHs and SNSF are the most commonly used source of information about the bilateral programmes. But instead of managing individual mailing lists for each unit, an effort to coordinate communication should be prioritised.
- All the LHs and SNSF have established simple and transparent application procedures that are acknowledged as such by most applicants.
- The bilateral programmes are in general well administered, and the administration receives positive feedback from applicants and grant recipients.
- All of the LHs have committed some resources to the development of relations with relevant institutions in their designated regions. And, according to the LHs, relations and trust are extremely important for the success of bilateral cooperation. But relation-building takes time, and personal meetings are often necessary to establish and maintain ties. It is difficult to cover more than a fraction of the group of new partner countries in a mandate period.

4.1 Communication, visibility and access to programmes

The right strategy for the communication of calls and the provision of general information about the bilateral programmes are important if the target group is to be reached (especially, since most calls are announced by small units). And with a decentralised model in place, it is vital to evaluate whether the LHs are successful in ensuring equal access for all prospect applicants. Communication and access to programmes are evaluated on the basis of feedback from applicants and interviews with programme managers.

In a survey, applicants were asked how they first learned about the programmes. Figure 4.1 shows the most important sources of information.

Figure 4.1. Applicants' most important sources of information about the bilateral programmes



Source: Survey among applicants. N=439

Half of the applicants surveyed first learned about the bilateral programmes by mail or newsletter from an LH or SNSF. Our interviews with LHs and researchers confirm that local mailing lists at each LH and the SNSF newsletter are the primary sources of information. The LH programme managers explained that calls are distributed to contacts at other Swiss research institutions, and that the LHs therefore rely on their colleagues to redistribute the calls to researchers relevant to the programmes.

The use of individual mailing lists at each university would appear to be suboptimal. Applicants report delays in call information when calls are distributed from one university to another. In the interviews, a few researchers even suspected LHs of circulating calls at their own university before distributing more widely to other universities.

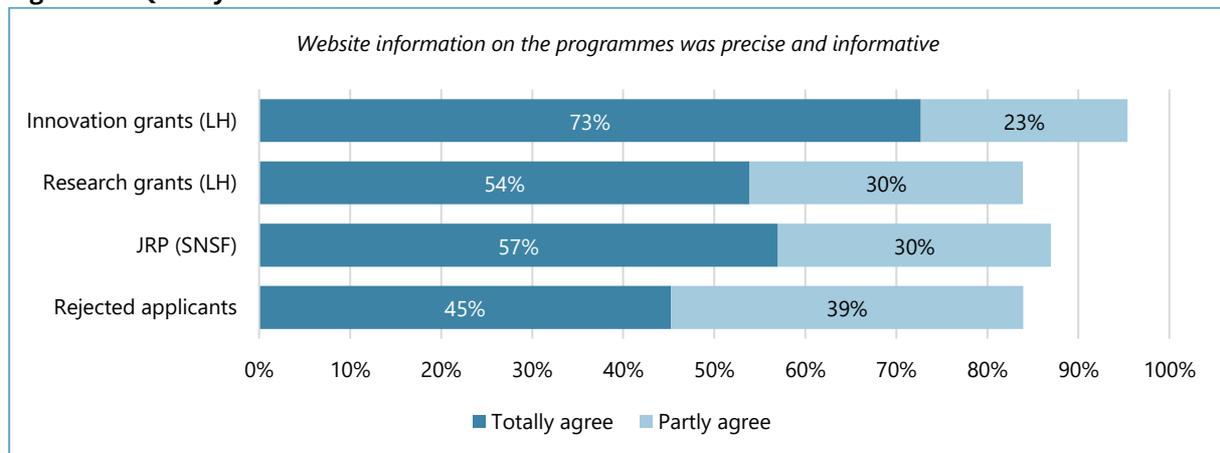
Instead of managing individual newsletters and mailing lists for each LH, an effort to coordinate communication could be prioritised. One option would be to use the central SNSF mailing list and allow researchers to subscribe to certain topics or regions, since SNSF is the biggest foundation to fund research in Switzerland, and most Swiss researchers are already subscribed to its newsletter. This would create groups of mail recipients, which could then be used by the individual LHs to distribute relevant information.²⁰ A joint mailing list would solve the problem of delays in calls distribution pointed to by some researchers.

According to the applicants we surveyed, the second most important sources of information about the bilateral programmes are the websites of SNSF and the LHs (Figure 4.1). All of the LHs have a subsite on their university's website. The structure and types of information available on these sites varies from one LH to another, but current call documents are always available.

In the survey, applicants were also asked about the quality of the websites describing the bilateral programmes. In Figure 4.2, the responses are shown, divided by type of instrument.

²⁰Due to GDPR concerns it might be necessary for researchers to register for a new central mailing list.

Figure 4.2. Quality of websites



Source: Survey among applicants. N=439

Note: "Partly disagree", "Totally disagree", "Don't know/remember" and "Not relevant" are not shown

Regardless of the type of instrument that the applicant applied for, and across rejected and successful applicants, website information on the programmes is regarded as precise and informative by the largest proportion of applicants.

In addition to the six LH websites, SERI has a landing page for the bilateral programmes with a short introduction and onward links to all of the LH websites. The SERI website is only reported as the most important source of information about the bilateral programmes by 5% of applicants (see Figure 4.1). In the interviews, most LHs state that SERI's website could be more informative, in terms of communicating the content of key instruments, call schedules, general rules/guidelines, and the fact that the LHs work in slightly different ways, etc.

Some more specific platforms for communication are also used by some LHs. Examples here include an online information platform for an AIT programme in Latin America hosted by LH HSG,²¹ and the SARECO-database of LH Basel, which provides information on collaborative research between Switzerland and African countries, enabling researchers to search more easily for research partners, collaborative institutions and funding instruments.²²

Some efforts have also been put into spreading call information via social media in the partner regions. Currently, it is primarily UAS LHs, LH HSG and embassies with science counsellors and swissnex that use social media. In the interviews, several LHs reported having had open discussions with embassies in their region on how to improve programme communication in the countries where the embassies are located.

The bilateral programmes are open to all researchers at swiss institutions. However, calls can focus on, or be formally limited to, for instance, young researchers and specific fields of research. In the early years of the programme, only the two federal institutes of technology, EPFL and ETHZ, were constituted LHs. Today, researchers from these two institutions are still frequent applicants (even though EPFL is no longer an LH). However, it is our impression that applicants are well distributed across the Swiss HEIs. As mentioned in Section 3.2, the mandating of ZHAW and HES-SO from 2017 is believed to have increased the visibility and

²¹ www.aitstartups.org

²² www.sareco.org

awareness of the bilateral programmes in research environments of applied science. It is also judged to have had a significant impact on UAS participation in the programmes.

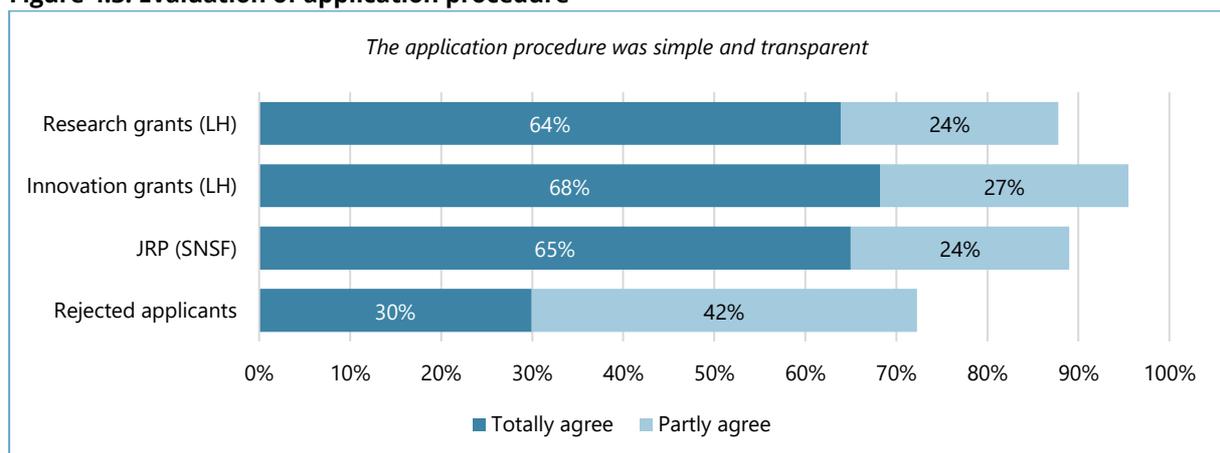
In conclusion, the bilateral programmes are in general considered visible to the target groups. Relevant researchers and environments are (after more than ten years of its operation) familiar with the LH model and the way calls are distributed. Nevertheless, an effort to coordinate communication should be prioritised.

The transfer of JRPs from the LHs to SNSF is believed to have eased access to this instrument, as it is now one of the SNSF funding options, and programme information and communication of calls are streamlined with the other programmes offered by SNSF.

4.2 Application phase

As discussed in the previous chapter, the duplication of administrative procedures is a disadvantage of decentralisation. Despite this, all of the LHs and SNSF seem to have established simple and transparent application procedures that are acknowledged by most applicants (see Figure 4.3).

Figure 4.3. Evaluation of application procedure



Source: Survey among applicants. N=439

Note: "Partly disagree", "Totally disagree", "Don't know/remember" and "Not relevant" are not shown

Figure 4.3 shows that in general grant recipients across research and innovation grants administered by the LHs and the JRPs offered by SNSF are very satisfied with the application procedure. Roughly two-thirds of the grant recipients we surveyed totally agree that the application procedure they engaged with was simple and transparent. Among rejected applicants this figure drops to just under a third.

The survey respondents were asked further questions about the application procedure. The results align with Figure 4.3, but they elaborate that call documents are generally regarded as clear and easy to understand, and that staff at the LHs and SNSF are found to be accessible and helpful when questions about the application process arise. These survey results are supported by our interviews with grant recipients, who further explain that the short application forms and rapid LH processing times are particularly satisfying.

Unsurprisingly, rejected applicants are less satisfied than successful ones. In the survey, critics point to less than transparent criteria for evaluation and vague rejection statements. They would like more information and transparency in the evaluation procedure, especially about the LH instruments. Two key actions that could address this request are:

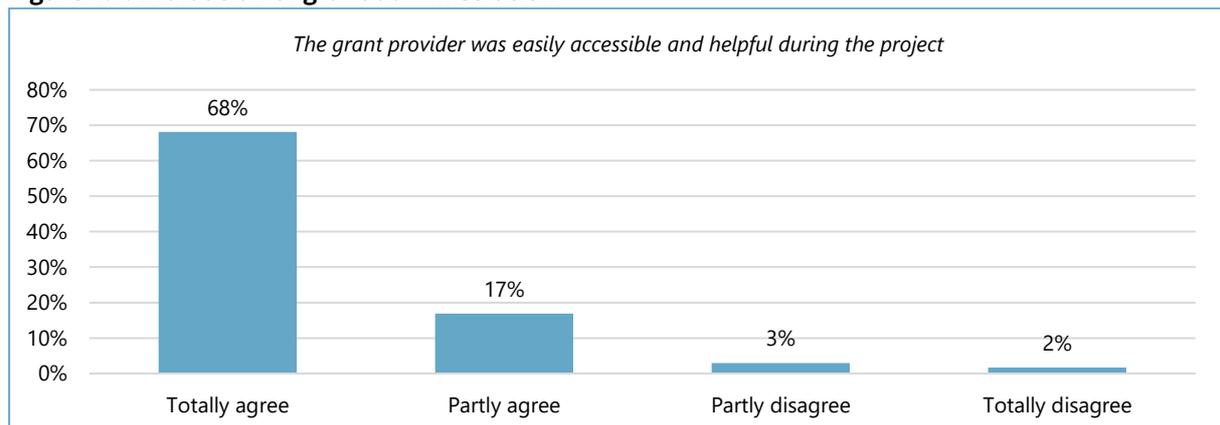
- Provide better information about the evaluation panel and their strategic and specific criteria for selecting projects.
- Offer more information about the reasons behind (not) selecting individual projects.

In relation to the latter point, there is an opportunity here for the LHs to play a greater role in assisting the development of rejected project proposals. For example, they might give a more thorough description of how a rejected application would need to be altered in order to succeed in the future, and provide other feedback on the applications. This would give the LHs an opportunity to bring their regional knowledge into play, in guiding the project plans to the next level.

4.3 Administration of grants

Grant recipients are in general very satisfied with project administration at the LHs and SNSF. The vast majority of grant beneficiaries find the operators very helpful and easy to access (see Figure 4.4).

Figure 4.4. Evaluation of grant administration



Source: Survey among grant applicants. Only beneficiaries are included in this question. N=301
 Note: "Don't know" and "Not relevant" are not shown

Thus 68% of the grant recipients we surveyed totally agree that their grant provider is easily accessible and helpful during the project, with an additional 17% party agreeing. Only 5% partly or totally disagree.

The survey further reveals that procedures for reporting and financial management during the projects are perceived as professional and efficient by the programme participants, with 8 out of 10 stating that the time spent on the contract, reporting and financial management is acceptable when the size of the grant is taken into consideration.

In the interviews, praise for the programme administration is virtually unanimous. Interviewees highlight the smooth communication and reporting requirements. The transfer of JRPs to SNSF was emphasised as a significant improvement by a few researchers who have experienced the administration of JRPs by both an LH and SNSF.

The only negative observation concerned differing policies on requests to extend project periods. At some LHs, these requests are likely to be agreed, but at others they are not. This issue constitutes an unnecessary complication of the programmes which makes them more difficult for the research community to understand, as discussed in Chapter 3.

4.4 Collaboration with partner regions/countries

All LHs are committed to developing relations to universities, funding agencies and other relevant stakeholders in their designated region according to their strategic goals (see Section 3.4).

According to the LHs, relationships and trust are extremely important for the success of bilateral cooperation. But relationship building takes time, and personal meetings are often necessary to establish and maintain ties. It is difficult to cover more than a fraction of the new partner countries in a mandate period.

All LHs have committed some resources to the development of relations with institutions in their designated regions such as universities, funding agencies and government agencies:

- **ETHZ:** Relations with China, Japan and Korea have been well established from the early mandate periods. But regular visits to funding bodies and government agencies are still important. Missions to some newcomers (e.g. Thailand) in the current mandate period have been completed. The primary focus was to promote the bilateral programmes among funding agencies and embassies/consulates.
- **HES-SO:** As a new LH in the MENA region, HES-SO has focused on promoting instruments in countries with which it has existing relations (Lebanon, Palestine, Morocco, Tunisia) targeting co-funding options and communication primarily. The Gulf region needs more exploration. It was eligible for the Innovation starting grant, and Dubai will be hosting the international Expo in 2020, where swissnex will establish a swissnex lab which will offer opportunities for HES-SO to collaborate and develop specific instruments.
- **HSG:** As a new LH, HSG has concentrated on 3-4 countries in Latin America, where it has made a large number of trips. Columbia has been given the highest priority in order to develop the AIT programme. Travel to the region is considered very important in terms of building relations with both funding agencies and universities.
- **ZHAW:** This LH has focused on the development of contacts and agreements with funding agencies in Bangladesh and, in process, Pakistan. Moreover, collaboration with SERI on mission trips and the moderation of research workshops with researchers from Iran.
- **UNIGE:** This LH is collaborating with embassies and consulates in communicating the programme to researchers in the region. But there has been little focus on developing relations with funding agencies in newcomer countries.
- **LH Basel:** For decades, Swiss TPH has had a natural collaboration with several African countries, and specifically Tanzania and Cote d'Ivoire, as a result of there being two locally operated research facilities in the countries funded by the bilateral programmes. The University of Basel has run a centre for African studies since 2001, and it has developed strong ties with South Africa through the Swiss-African Research Cooperation (SARECO) project since 2008.



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5. Programme results

In this chapter, we evaluate results in terms of the outputs (deliverables) of the supported projects and the short-term effects of the bilateral programmes. Long-term impact of the programmes are discussed later in Chapter 6.

The findings presented in this chapter are based on survey data and interviews with grant beneficiaries. The most of them important are:

- The vast majority of research grants (both JRPs and LH grants) lead to scientific output. In all, 85-90% of the grants are expected to lead to scientific publications in international journals.
- Almost 70% of the LH-supported projects and 40% of JRPs have led to, or are expected to lead to, new proposals for larger projects – developed in collaboration with the foreign researchers.
- All participants in the biggest innovation programme (Academic-Industry Training) report that they have improved their entrepreneurial skills and developed new business plans or business models (including expected results).

5.1 Outputs

The table below provides an overview of the number of supported projects in the current mandate period for the LHs divided into the different types of grant, as presented in Chapter 3. Success rates for each grant type are also indicated.

Table 5.1 Number of LH grants and success rates 2017-19, divided into grant types

| | Instrument | No. of grants | Success rate |
|-------------------|--|---------------|--------------|
| Research Grants | Seed Money Grants | 123 | 37% |
| | Mobility/Exchange Grants | 72 | 76% |
| | Bridging Grants/Research Merger | 26 | 15% |
| | <i>Subtotal</i> | 221 | 36% |
| Innovation Grants | Academia-Industry Training (AIT) | 52 | 50% |
| | Innovation Partnership/Starting Grants | 27 | 14% |
| | Business Development Programme | 7 | N/A |
| | <i>Subtotal</i> | 86 | 27% |
| Special Grants | Event/Opportunity Grants | 40 | N/A |
| | Bilateral Research Chairs | 15 | 42% |
| | Programme Starter Grants | 11 | 46% |
| | <i>Subtotal</i> | 66 | 43% |
| Total | | 373 | 33% |

Source: Estimates are based on mid-term reports and interviews with LHs, 2017-2019. Data gathered in July 2019

Note: The success rate is only calculated for instruments where we had access to the total number of applications

As the figure shows, 373 projects have been funded in the current mandate period. Of these, the majority, 221, are research grants. The success rates differ significantly across grant types, with the highest rates for mobility grants and the lowest for bridging grants – a difference reflecting the fact that small grants tend to have higher success rates.

Table 5.2 shows similar numbers for JRPs. Since these are distributed much less frequently, the table includes all funded projects since SNSF was mandated to administer the programme in 2013. In the table, grants (numbering 152), success rates and numbers of calls are broken down by priority country.

Table 5.2 Number of JRP grants, calls and success rate, divided into priority countries

| Priority country | Number of grants | Success rate | Number of calls |
|------------------|------------------------|-------------------------|-----------------------|
| Argentina | 10 | 12% | 1 |
| Brazil | 12 | 52% | 1 |
| China | 11 (<i>see note</i>) | 12% (<i>see note</i>) | 2 (<i>see note</i>) |
| India | 22 | 13% | 2 |
| Japan | 11 | 23% | 2 |
| Russia | 25 | 45% | 1 |
| South Africa | 37 | 24% | 2 |
| South Korea | 24 | 30% | 2 |
| Total | 152 | 22% | 13 |

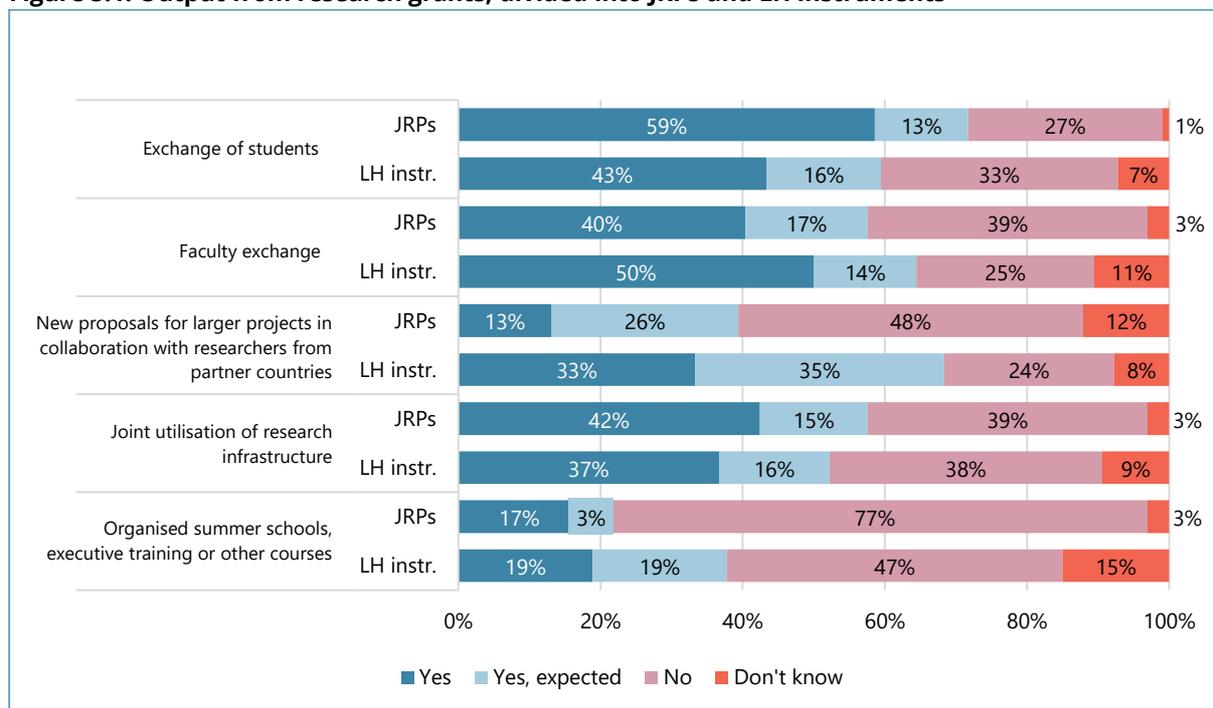
Source: SNSF

Note: Data are only available for one of the two rounds with China. Only this round is included in the number of grants shown for China

The table shows that numbers of grants are somewhat unevenly distributed across priority countries – this is mostly due to differences in the numbers of calls.

In the survey, recipients of JRPs and LH grants (other than innovation grants) were asked to indicate what kinds of output their bilateral research project had already delivered (or was expected to deliver if the projects were not finalised). The results are presented in Figure 5.1.

Figure 5.1. Output from research grants, divided into JRPs and LH instruments



Source: Survey of grant applicants. Only beneficiaries are included in this question, and innovation grants are excluded. N=279

Note: An analysis that only includes projects started in 2015 or earlier suggests the level of "Yes, expected" answers is realistic for all categories

Overall, student and faculty exchanges are the most common outputs of the bilateral programmes. Faculty exchanges are more common for LH instruments than in JRPs, which is not surprising, because most LHs offer dedicated mobility/exchange grants for this purpose. On the other hand, JRPs include student exchanges more often than LH instruments.

According to the LH programme managers, exchanges of researchers at all levels are important in the development of research cooperation between Switzerland and countries with high development potential, because they are very likely to result in long-term personal relationships. This view is shared by all of the interviewed researchers who have benefitted from a mobility grant.

Several of the researchers we interviewed stated that exchanges might benefit young researchers more than their senior colleagues because the former are less likely to yet have an extended international network, less burdened by private and professional obligations, and thus freer to move. This view is shared by the majority of LH representatives and mirrored in the fact that many calls for exchange and mobility grants are directed at young researchers.

The survey also reveals that every third LH grant has led to new proposals for larger projects. Another third of the researchers we surveyed (35%) expect this, indicating that most of the research projects supported by the LHs are successful in developing both relationships and results that facilitate further cooperation and invite more thorough research efforts.

In the interviews, the researchers confirm that development of a new proposal for a larger joint project is considered a key objective in all types of LH instrument. In addition, some researchers state that their LH grant was regarded as a seal of approval for their research project when they were applying for next-step funding.

Joint utilisation of research infrastructure is a common output. This is especially true of JRPs (57%, including expected), but it is also the case in LH projects (53%, including expected). Thus, the bilateral programmes are often used to obtain access to special research facilities and expertise that is not available in Switzerland. Examples are expertise in exotic crops and species, access to patient samples relating to tropical diseases, and also niche expertise in, for instance, the validation of genes in animal models (see the case described in Box 5.1).

Finally, organised summer schools, and executive training or other courses, are the least common outputs of JRPs and LH instruments. This reflects the fact that such activities are only the objective of a few special grants offered by some of the LHs (e.g. the programme starter grant at UNIGE).

Box 5.1. Access to a world class research laboratory in Buenos Aires

With a seed money grant, a research team working on male fertility at the Swiss Institute of Bioinformatics (SIB) was able to start a validation study of promising genes in animal models in Argentina. As SIB does not have the wet room facilities required to validate genes in animal models, access to proper lab facilities and world class researchers in the field was arranged in Buenos Aires.

The Swiss team at SIB knew the researchers in Argentina but had never worked on a joint research project before. The two teams had discussed the study for a while, but access to the lab was too expensive for the Argentinian partner to cover without external funding. Thus, the seed money grant was spent primarily to cover expenses related to use of the lab.

During the project, the eight most promising genes from the SIB research were validated in the Argentinian lab. Of these, five have shown promising preliminary results. A few conference papers have been presented, and the two research groups are planning a joint research article. But further research is needed. The scope of the seed money project was too ambitious to be completed within the one-year funding period.

Besides lab access, the grant covered the travel costs of two members of the Swiss team completing a workshop in Buenos Aires, and an Argentinian PhD student was involved and spent time in Geneva as part of his thesis.

Source: Interview with seed money grant recipient

5.2 Short-term effects

Short-term effects are measurable outcomes of projects that occur shortly after the project or within 1-2 years. Because the focus, goals and project activities of research grants and innovation grants differ significantly, outcomes from these two grant types are considered separately below.

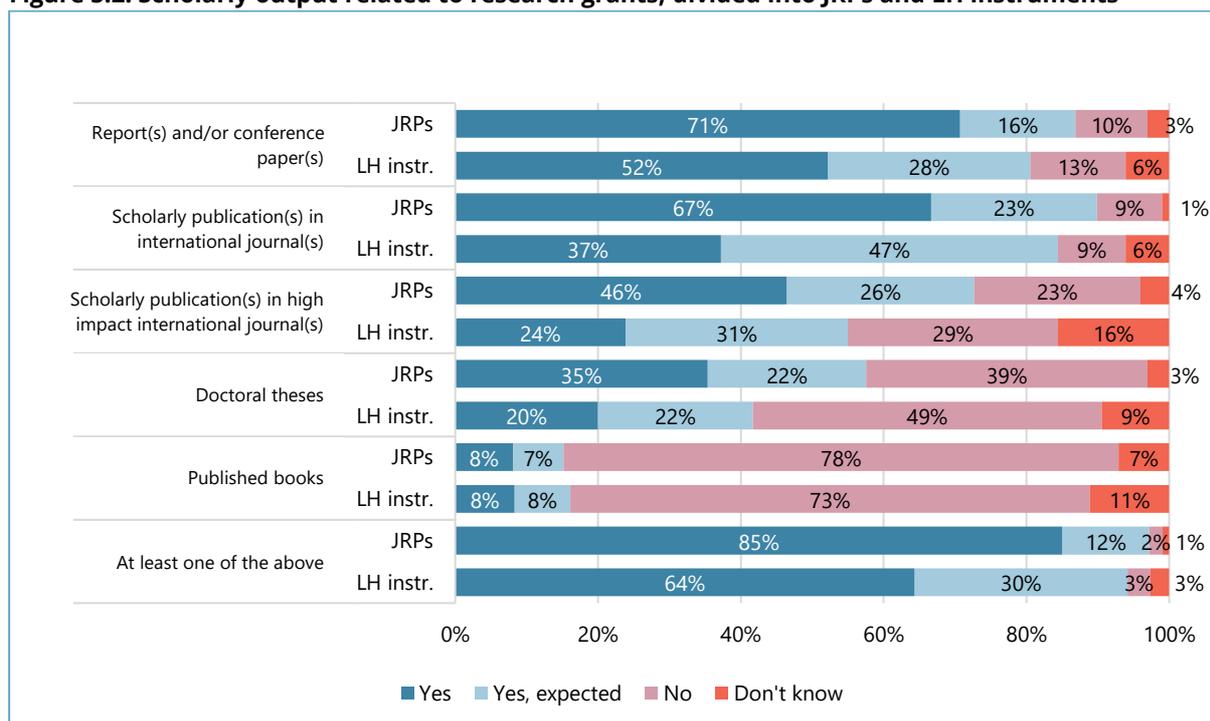
With research grants, the typical short-term effects are publications in international scientific journals and other types of scientific product. Short-term effects also include the extent to which that researchers/partners succeed in attracting follow-up funding. It of interest to measure whether the grants enable researchers to enlarge their international networks.

Innovation grants can result in various short-term effects. Common outcomes of innovation projects are new patents, prototypes, products, services and business plans. Since most of the LH grant recipients benefiting from this type of grant have participated in Academia-Industry Training (AIT) programmes, we chose in the survey to focus in addition on entrepreneurial skills and business models which are expected outcomes of this instrument.

Research grants

In the survey, grant recipients were asked whether the collaborative project had led to various types of scientific outcome. Since it can take some time to submit and publish research articles, and since the survey also includes those who have only recently obtained grants, the surveyed researchers also had the option to report expected scholarly output. The figure below shows scholarly output in terms of publications from JRPs and research-oriented LH instruments.

Figure 5.2. Scholarly output related to research grants, divided into JRPs and LH instruments



Source: Survey of grant applicants. Only beneficiaries are included in this question, and innovation grants are excluded. N=279

Note: An analysis that only includes projects started in 2015 or earlier shows that the level of "Yes, expected" answers is realistic for all categories

The bars at the bottom of the figure show that 85% of JRPs and 64% of LH projects had led to scholarly outputs. And that almost all collaborations are expected to do so.

Furthermore, the figure shows that the most frequent scholarly outputs are reports, conference papers and scholarly publications in international journals. This is true for all the research grants we surveyed, but JRPs lead to scholarly output more often than LH instruments.

In all, 46% of the surveyed researchers who benefitted from a JRP have subsequently published in high impact journals, and an additional 26% expect to do so. The share of LH instruments leading to publications in high impact journals is significantly lower. However, it is important to recall that JRPs normally run for 3-4 years with a budget up to CHF 350,000 for the Swiss partner, while the LH grants typically provide researchers with CHF 10,000-25,000 for a one-year project.

Doctoral theses are reported as concrete outputs by a third (35%) of the JRP recipients we surveyed. In addition, 22% expect that a doctoral thesis will be published with the support of the grant. In interviews and open survey answers, some respondents also mentioned Master's dissertations as outputs of their project.

Published books are a rare output of the bilateral programmes and associated almost exclusively with researchers in the humanities and social sciences.

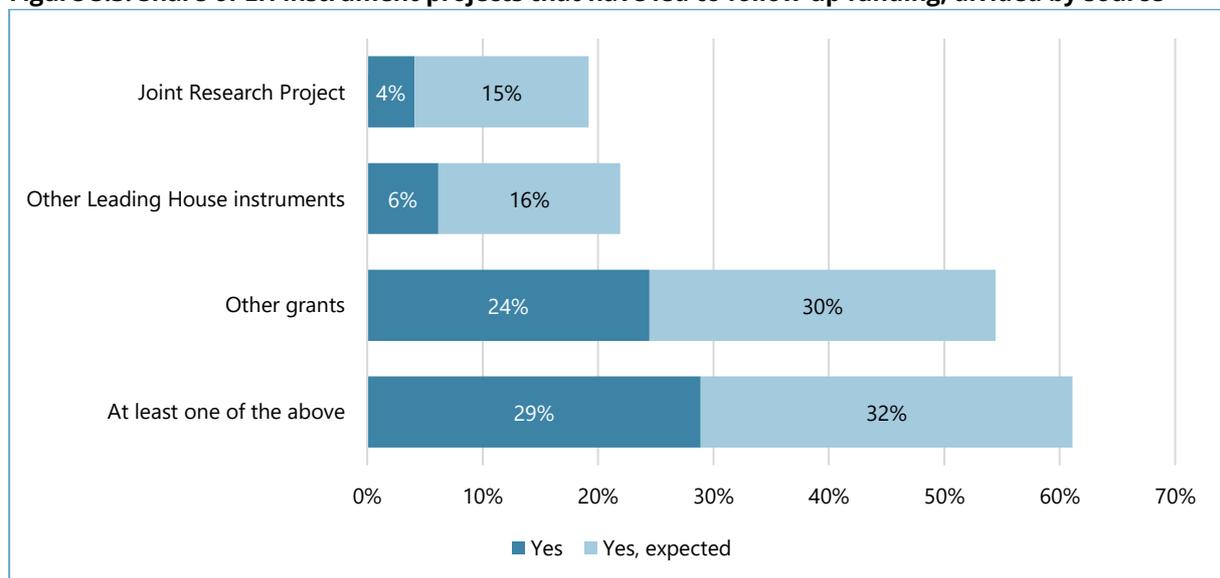
Denmark and Sweden supply programmes with many similarities to the Swiss LH instruments (see Chapter 7). The key programmes in these countries have been evaluated, including through surveys of grant beneficiaries, who were asked whether their projects have led to scientific publications of any kind. In Sweden, two-thirds of the project leaders report that their projects have led to scientific publications.²³ The evaluation of the Danish programme contains very similar results. Nearly three-quarters (71%) of the Danish programme participants report that they co-published with researchers from their partner institution in the years following the grant.²⁴ The results from Sweden and Denmark are quite close to the shares of those participating in LH instruments who report that their project led to scientific publications (64% reported at least one of the options).

Another 30% of the research-oriented LH projects report that future scholarly output related to the project is expected. The grant beneficiaries surveyed in Sweden and Denmark were not asked about expected scholarly output.

Follow-up funding

Another important metric to evaluate is whether the supported projects are successful in attracting funding for further research collaboration. In the survey, beneficiaries of LH grants were asked whether their grant/project had led to new collaborative research activities with researchers from the partner country that was financed through other grants or programmes. The responses are shown in Figure 5.3.

Figure 5.3. Share of LH instrument projects that have led to follow-up funding, divided by source



Source: Survey of grant applicants. Only LH instrument beneficiaries are included in this question. N=179

Note: "No" and "Don't know" are not shown

As the figure illustrates, 29% of bilateral projects supported by the LHs have led to follow-up funding. An additional 32% expect that follow-up funding will be obtained at a later time.

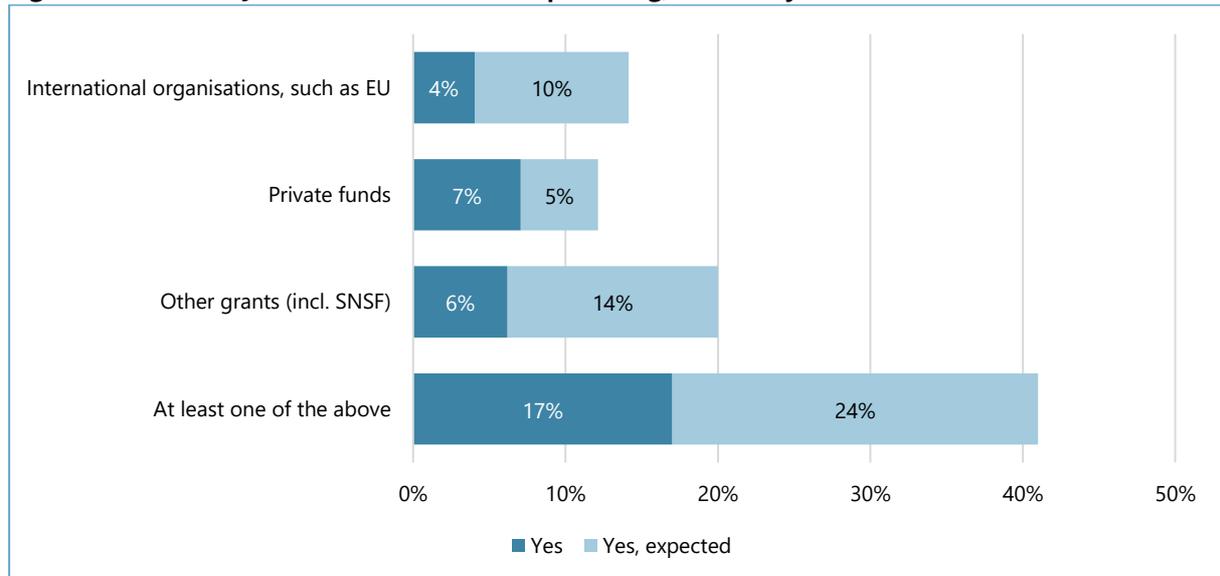
²³ Sweco (2019): "Evaluation of STINT's programme Initiation Grants for Internationalisation".

²⁴ Graversen, E. K. et al. (2016): "Evaluation of International Network Programme 2009-2014"

An interesting observation is that the bulk of the follow-up funding does not flow from the bilateral programmes (JRPs or other LH instruments). Every fourth LH project has been successful in attracting funding from various other sources to continue collaborative activities with the partner country. The three most frequently mentioned sources here are the EU, SNSF (not JRPs) and private funds.

In the survey, JRP participants were also asked about follow-up funding. The results are shown in Figure 5.4.

Figure 5.4. Share of JRPs that lead to follow-up funding, divided by source



Source: Survey of grant applicants. Only JRP beneficiaries are included in this question. N=100

Note: "No" and "Don't know" are not shown

As can be seen from the lower bar, 17% of the JRPs we surveyed state that they have attracted follow-up funding, and another 24% expect their project to lead to such funding.

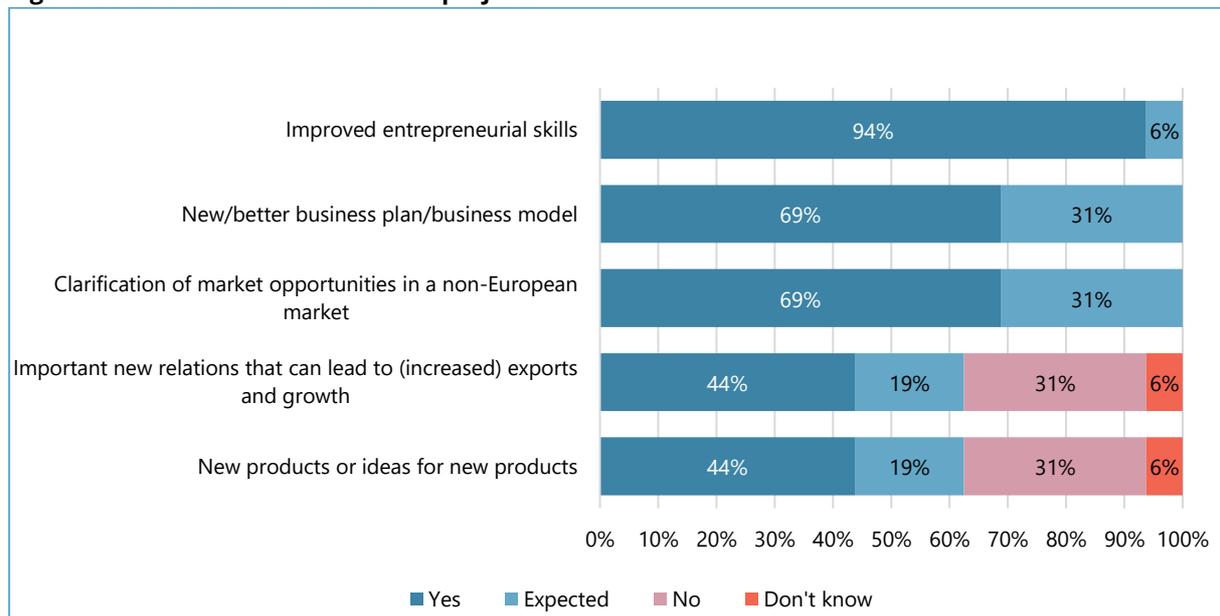
It was anticipated that the LH projects would obtain follow-up funding more often than JRPs, because LH instruments are designed to cover the early stages of bilateral cooperation while JRPs are usually relevant at a later stage.

The continuation of partnerships, however, is not reserved for projects with follow-up funding. From the interviews with grant beneficiaries, it is evident that most project partners funded by the bilateral cooperation programmes stay in touch after the project has ended, paving the way for the long-term relationships we shall elaborate in the next chapter.

Innovation grants

Innovation instruments are not as widely used as research instruments in the LH portfolio. All the same, in the present mandate period (2017-2020) more attention is being given to innovation activities as means of fostering bilateral cooperation (see Chapter 3). Among the survey respondents, only 22 had received an innovation grant, of which 16 were Academia-Industry Training (AIT). Figure 5.5 provides an overview of short-term outcomes of AIT projects.

Figure 5.5. Short-term effects of AIT projects



Source: Survey among grant applicants. Only AIT beneficiaries are included in this question. N=16

Note: The figure includes both realised and expected effects

A key goal of the AIT instrument is to develop and improve participants' entrepreneurial skills. In the survey, all of the participants agreed that the programme had fulfilled its mission in this respect (or is expected to do so).

The AIT programme also allows researchers to validate an innovative concept in direct contact with business representatives in Switzerland and in a partner country. Despite the low number of respondents, the survey results indicate that the programme is successful in facilitating this, and that this leads to concrete outputs such as refined business plans and the clarification of market opportunities in non-European markets.

Bearing in mind that AIT projects involve researchers and entrepreneurs working with early-stage technologies, it is impressive to see 44% of the AIT participants we surveyed stating that their project has already led to, or is expected to lead to, new products or relations that are important for exports and growth.

In the interviews, the participants described AIT as a valuable way of "checking out of the lab implementation" of their research. Market realities differ from scientific realities, and for scientists with no experience of commercialisation much can be gained from a short AIT project. Many AIT projects are not yet at the stage where new relations lead directly to exports and growth. But the network into the start-up world is highlighted by the participants as a very – in some cases, the most – important output of the AIT programme.

6. Long-term impact

The goal of the bilateral cooperation programmes is to establish and strengthen long-term and sustainable partnerships between Swiss researchers/universities and scientific hotspots in overseas countries outside the EU, North America and Australia. It is therefore important to evaluate the long-term impact of the programmes. In this chapter, we look at activities and changes reaching beyond the scope of the projects and their more immediate, short-term effects.

Solid indicators and reliable data for long-term impacts are bound to be elusive, since the bilateral cooperation programmes are just one of many factors influencing the internationalisation of Swiss science and technology. The evaluation of long-term impact here is based on survey and interview data collected from grant beneficiaries, programme managers, high-level representatives from Swiss universities and Science & Technology counsellors.

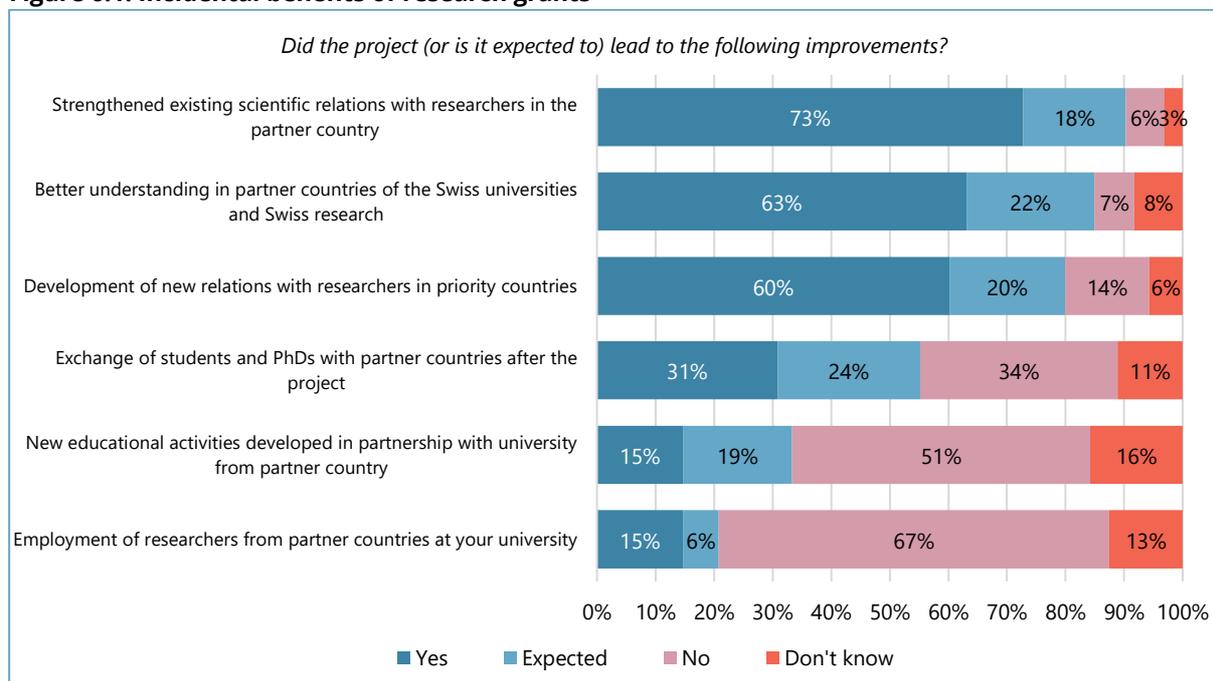
Research grants and innovation grants differ markedly in their focus, goals and project activities, so the outputs from these two types of grant are considered separately below.

The key findings presented in this chapter include:

- The programmes enhance excellence in Swiss research communities by 1) linking to scientific hotspots in developing countries, 2) increasing the diversity of the research conducted at Swiss universities.
- Nine out of ten research grant beneficiaries have strengthened existing scientific relations with their partner institutions as a result of the grants. And 80% have developed new relations.
- More than 50% of the projects lead to exchanges involving students and young researchers *after* the supported projects have concluded.
- It is expected that a third of the projects will initiate activities leading to new educational activities being developed in collaboration with foreign partners.
- Half of AIT participants establishing new companies expect their participation to lead, to a great extent, to higher growth in the companies.
- Scientific diplomacy, although difficult to measure, is believed to have strengthened under the bilateral programmes.

Research grants

In the survey, grant beneficiaries were asked if their projects had led to, or were expected to lead to, “incidental benefits” beyond the direct output of the project activities. Their responses are presented in Figure 6.1. The survey revealed very similar results for LH instruments and JRPs. For this reason, the results we set out in this and the following figure are combined.

Figure 6.1. Incidental benefits of research grants


Source: Survey of grant applicants. Only beneficiaries are included in this question, and innovation grants are excluded. N=279

Three incidental benefits of the bilateral programmes stand out. Across JRPs and LH instruments, 73% of the grant beneficiaries report that their projects have strengthened existing relations with the partner country, and 60% state that new relations have been developed. 63% report that understanding of Swiss universities and Swiss research has improved in the partner country as a side-effect of the project. And about 20% of the researchers we surveyed expect their project to lead to these three types of benefit.

Another result worth noting is that 31% of surveyed researchers report that their project led to student and PhD exchanges after the conclusion of the project. Another 24% expect student exchanges to happen after the project, indicating that every second project is likely to generate further bilateral activities. We need to be careful, however, not to overemphasise the share of “expected” answers, as a separate analysis of projects started in 2015 or earlier has shown that the level of “Yes, expected” may be overrated.²⁵

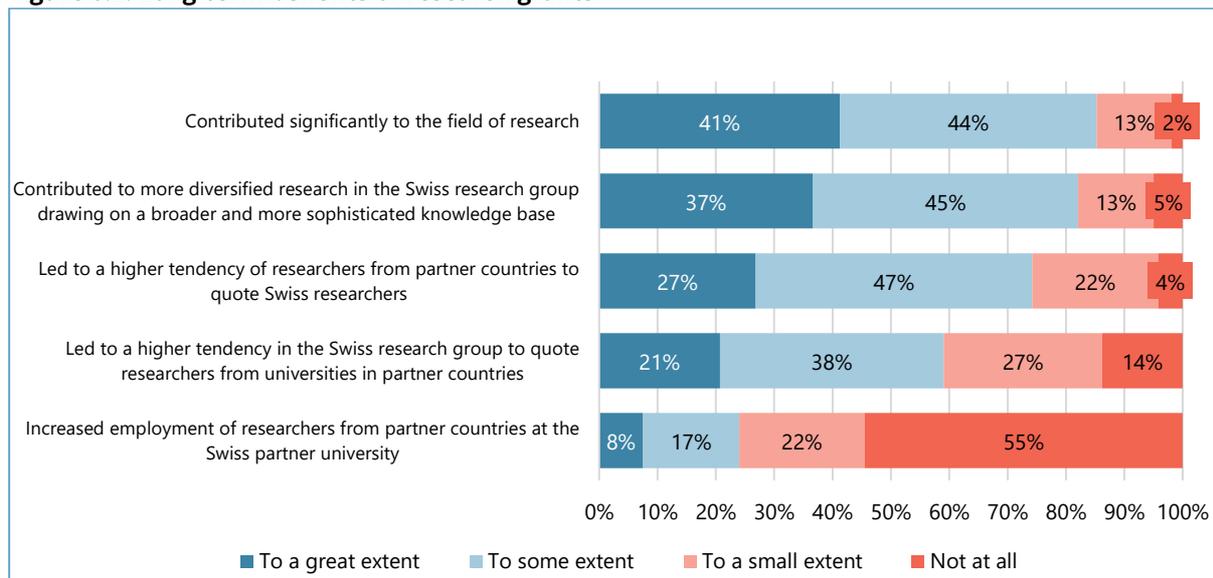
When they were asked more openly about the long-term effects of the programmes, almost all of the interviewees across all grant types stressed the value of relationship-building. The opportunity to visit colleagues abroad and either establish or strengthen personal relationships is the real value of the programmes, according to the vast majority of the researchers.

One researcher explained that his new relations with a partner in Brazil, and detailed knowledge of that partner’s research strengths, would be a great advantage next time a call is launched, because he will know exactly who to include in a future proposal. Another said that a Chinese partner from a 10-year-old JRP is now in a leading position at a Chinese university, where he is promoting exchanges involving Chinese students and Switzerland as a result of the relationship.

²⁵ In cases where respondents had the option of indicating expected results because their project has recently ended (within the last 1-2 years), a separate analysis was conducted including only projects started in 2015 or earlier. The purpose was to estimate whether expectations indicated by recently ended projects were realistic.

In the survey, recipients of JRPs and research-oriented LH instruments were also asked to assess the extent to which the grants lead to five predefined long-term benefits. Researchers from recently ended projects (within the last 1-2 years) were asked to indicate their expectations. The results are shown in Figure 6.2.

Figure 6.2. Long-term benefits of research grants



Source: Survey of grant applicants. Only beneficiaries are included in this question, and innovation grants are excluded. N=190-262

Note: The figure includes both realised and expected effects. "Don't know" and "Not relevant" are excluded from totals on a statement-by-statement basis

The figure shows that the bilateral programmes impact Swiss research in several ways. 41% of those surveyed indicate that their participation has contributed to a great extent to their field of research (or is expected to do so for recent grant holders). Another 44% believe that this has occurred to some extent.

Almost the same share of the researchers we surveyed report that participation in the bilateral programmes has contributed (37% to a great extent and 45% to some extent) to more diversified research in their research group. In the interviews, researchers explained that long-term relationships with overseas research communities lead to new perspectives on their research and strengthen theories, as they are tested in new contexts.

Most of the survey respondents also indicate that long-term relationships are, at least to some extent, expected to be mirrored in a higher tendency to quote each other.

About a quarter of those surveyed believe that, in the long-term, the programmes increase the numbers of researchers employed from partner countries at Swiss universities.

All of the LH programme managers and high-level representatives we interviewed are confident that the bilateral programmes have important long-term benefits for Switzerland. But they stress that it is a long haul. They emphasise the importance of the bilateral programmes in science diplomacy. Exchanges of researchers and students, relations with overseas government agencies and knowledge institutions, along with memoranda of understanding, build trust between Switzerland and the partner countries. The long-term impact of capacity-building and the development of human resources in partner countries cannot be underestimated, according to the high-level representatives we interviewed. This view is also voiced by the science

counsellors we interviewed – counsellors, that is to say, who are based in the partner countries and have been following developments first-hand.²⁶

In the interviews, capacity-building and the development of human resources in partner countries were also described as important long-term effects by some researchers who have benefitted from the programmes. In some cases, the interviewees even highlighted societal impacts in the partner countries that are directly related to the programmes: an example is presented in Box 6.1.

Box 6.1. Direct, real-life impact from a Seed Money Grant and JRP

A Swiss professor of parasitology and epidemiology had conducted several studies in Africa and South-East Asia focusing on worm infections.

Initially, he received a Seed Money Grant, which was used for studies investigating the species and human worm parasites, as well as their transmission and epidemiology in the Lao People's Democratic Republic (Lao PDR), which had been severely understudied for years.

The results and learning points from the first grant led to a larger Joint Research Project, allowing the research team to further study the epidemiology of the worm infections, and to determine the morbidity (human disease) associated with the infection in the affected communities, as well as to explore the circumstances in which patients would benefit from various types of treatment, including surgery. In this study, radiologists, parasitologists and epidemiologists screened thousands of people for worm infection and its associated diseases, including fatal bile duct cancer (cholangiocarcinoma).

The grant also facilitated the development of human resources and local knowledge of public health relevance in Lao PDR. It laid the foundation for a current initiative allowing doctors and surgeons to provide treatment for severe liver disease (bile duct cancer) free of charge.

The projects have resulted in a South-East Asian research centre, located at the Lao Tropical and Public Health Institute (Lao TPHI) in Vientiane being upgraded with the knowledge and capabilities needed to investigate the disease, and to local hospitals being able to offer the right treatments.

The professor believes that the projects had a pivotal role in raising awareness of a major public health problem and in developing crucial knowledge of the nature of the disease and the best way to address it.

Source: Interview with Seed Money/JRP grant recipient

Looking across the input from interviews and survey results, we can see clearly that the JRPs and research-oriented LH instruments help to bring about long-term benefits in a variety of ways. Existing scientific ties are strengthened, and new relationships are formed. The programmes further develop the excellence in Swiss research communities by linking them to scientific hotspots in developing countries. Finally, scientific diplomacy – however difficult it is to measure – is believed to have strengthened under the bilateral programmes.

Innovation grants

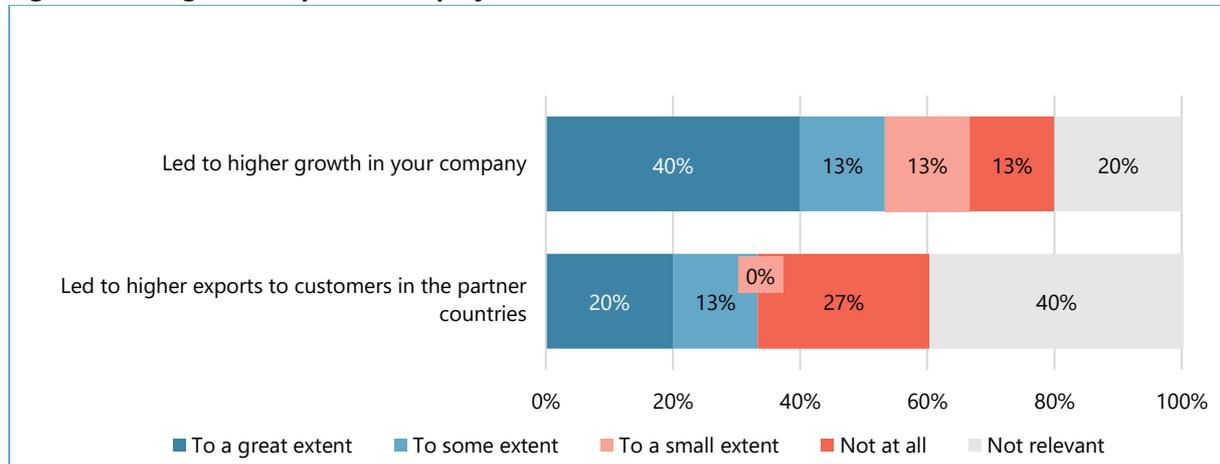
The main purpose of the innovation grants is to transform high-level applied research into market applications, and the long-term vision is to foster innovative start-ups that are born international. Innovation grant projects are a minor part of the combined LH portfolio (see Table 5.1 in Chapter 5), and many innovation initiatives are still young. This means that the long-term benefits are yet to emerge.

This notwithstanding, innovation grant beneficiaries were asked in the survey to assess the extent to which their participation in the bilateral programmes led to long-term impact in terms of higher growth and

²⁶ The publication "Swiss-South Africa - Joint Research Programme" (forthcoming) provides an excellent overview of the development of Swiss-South African relations, for example.

exports. Again, participants from recently ended projects (within the last 1-2 years) were asked to indicate expectations.

Figure 6.3. Long-term impact of AIT projects



Source: Survey of grant applicants. Only AIT beneficiaries are included in this question. N=15

Note: The figure includes both realised and expected effects. "Don't know" is excluded from totals on a statement-by-statement basis

Among the 15 AIT participants who responded to the question, it can be seen that 40% indicated that, to a great extent, the programme had led, or is expected to lead, to higher growth in the company. And 20% indicated that, to a great extent, the programme had led, or is expected to lead, to higher exports to customers in the partner countries.

The results should be interpreted with caution given the small sample of respondents. However, they are broadly confirmed by the St. Gallen LH (HSG). In the interview, the programme managers for AIT Brazil explained that the LH follows participating AIT companies and has found that 4 out of 10 companies were able to export their products after a year.

The expected long-term impact of innovation grants is remarkable. AIT is an intensive programme, but it is short and cannot be expected to boost company growth alone. Insights from the interviewed participants suggest that the close collaboration with partner country agents opens doors to technology validation in potential markets and delivers feedback from potential customers. For technologies/products with huge potential in countries outside the EU, North America and Australia, early market validation and local feedback is essential if time to market is to be reduced.

A photograph of the University of Geneva building, a grand neoclassical structure with a light-colored facade, arched windows, and a central entrance. The building is partially framed by a large tree with bright yellow-green autumn leaves in the foreground. In the lower part of the image, a large group of people is sitting on a green lawn in front of the building, some talking and some reading. A person with a backpack is standing near the center. The sky is bright and clear.

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7. Development in research collaboration – Switzerland benchmarked against other European countries

7.1 Introduction

When evaluating the bilateral programmes, it is essential to map the overall development in research collaboration between Swiss researchers and researchers from priority countries/regions, and to examine how the development in research collaboration has evolved as compared with similar developments in other European countries with bilateral programmes.

There is, of course, no 1-1 relationship between the development in research collaboration with priority countries and a programme's impact. But since the aim of the bilateral programmes is to stimulate and maintain cooperation with specific countries and regions, it is of real interest to measure whether cooperation with these countries is increasing, and to ask how Switzerland's performance here compares with that in other countries with bilateral programmes.

Analyses of what other countries are doing, and how successful their programmes are, are an important source of inspiration in the development and evaluation of policy programmes. It is interesting to compare a programme's design, budgets, grant limits, and the like, with similar factors in countries that are performing well in the areas the programme is targeting.

In this chapter, using data from the international bibliometric database Scopus, we first investigate developments in global research cooperation in Switzerland and seven other European countries. We then compare the bilateral programmes in Switzerland with similar programmes in three of the other European countries.

Section 7.2 explores overall developments in international research cooperation among Swiss researchers. It examines both research cooperation in general and, more specifically, cooperation with countries where Switzerland has bilateral agreements.²⁷ These developments are benchmarked against Austria, Denmark, Germany, the Netherlands, Norway, Sweden and the United Kingdom. These countries were selected because they are all performing well in international comparisons of research production/quality, and because they all offer programmes stimulating bilateral research cooperation with countries outside the EU.

In Section 7.3, we present key programmes in Denmark, Sweden and the UK. These three countries were chosen because they have the highest total growth in cooperation with the priority countries. Moreover, Sweden and Denmark are approximately the same size as Switzerland.

Finally, in Section 7.4 we attempt to compare the programmes offered in Switzerland, Denmark, Sweden and the UK, and to map similarities and differences across the programmes.

The chapter reveals, among other things, that:

- Switzerland experienced a high growth in international research cooperation generally between 2007 and 2017, and in Switzerland the share of collaborative publications co-authored with foreign

²⁷ Since the bilateral programmes focused on countries rather than regions until 2016, and since it takes time to translate early stage grants into research outcome, the chapter concentrates on the development in research cooperation with priority countries that were also target countries in the earlier mandate periods (Brazil, China, India, Japan, Russia, South Africa and South Korea).

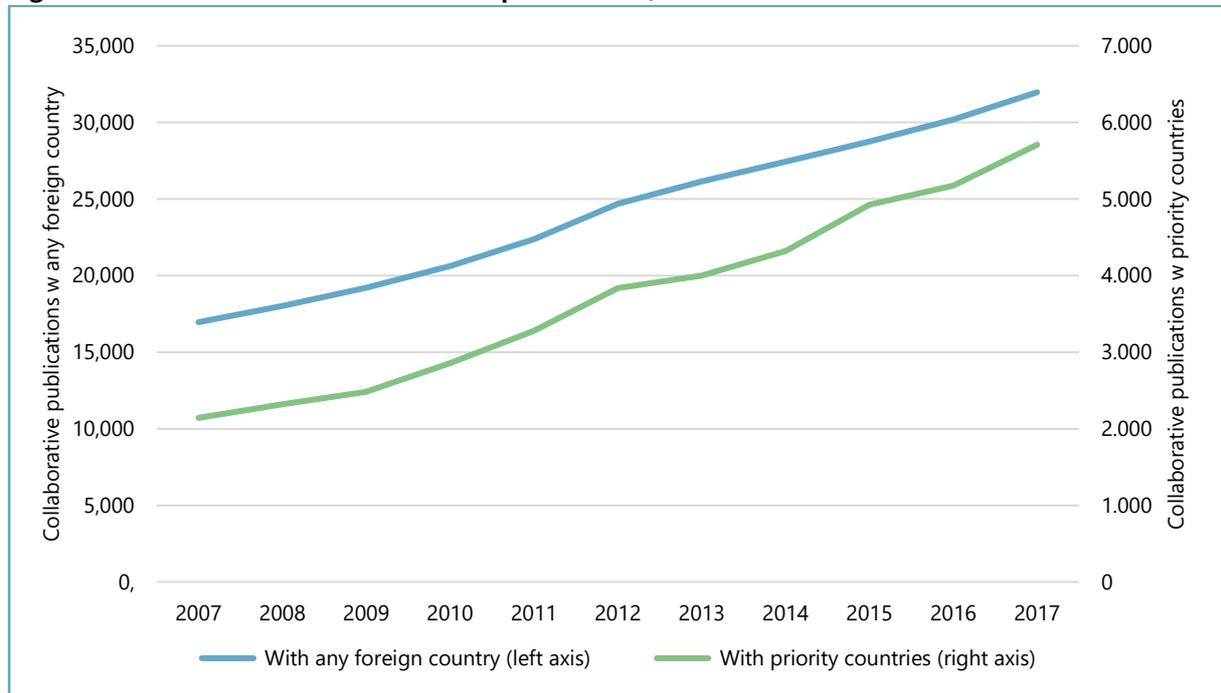
researchers relative to all scientific publications is significantly higher than that seen in the benchmark countries (see Figure 7.3).

- When the collaborations are compared specifically with those in the selected priority countries, the Swiss performance is more modest. Switzerland is ranked no. 4 among the eight European comparison countries as regards the share of all publications that are co-published with at least one researcher from the selected countries.
- Denmark, Sweden and the UK run very similar types of programme stimulating the development of new ideas, networks and bilateral research cooperation with countries outside the EU. But only the Swiss programmes require co-funding from partner countries in the seed phase. A written expression of interest is required in the programmes in the countries being compared.
- Grant limits are similar in Switzerland and Denmark in the seed phase, but programmes in Sweden and the UK allow for bigger projects and a longer time frame.
- In the evaluation of proposals in the seed and bridging phases, more emphasis is put on the exploratory nature of the networks, and on the development of new networks in Sweden and Denmark. The Swiss criteria focus attention on the project idea and its potential.
- Programmes supporting bilateral research projects (JRPs in Switzerland) are supplied with greater frequency in the comparative countries.
- In the UK, bilateral research and innovation cooperation has been moving towards integration with goals set out in long-term official development assistance (ODA). As such, recent funds have displayed a distinct focus on the promotion of fair and equitable partnerships supporting the development of people, communities, universities, businesses and governments in low-income and middle-income countries in Africa, Asia and South America.

7.2 Developments in research cooperation in Switzerland

As a first step, Figure 7.1 shows the growth over the period 2007-2017 in the numbers of publications co-authored by Swiss researchers and colleagues from other countries generally and the seven priority countries.

Figure 7.1. Growth in Swiss collaborative publications, 2007-2017

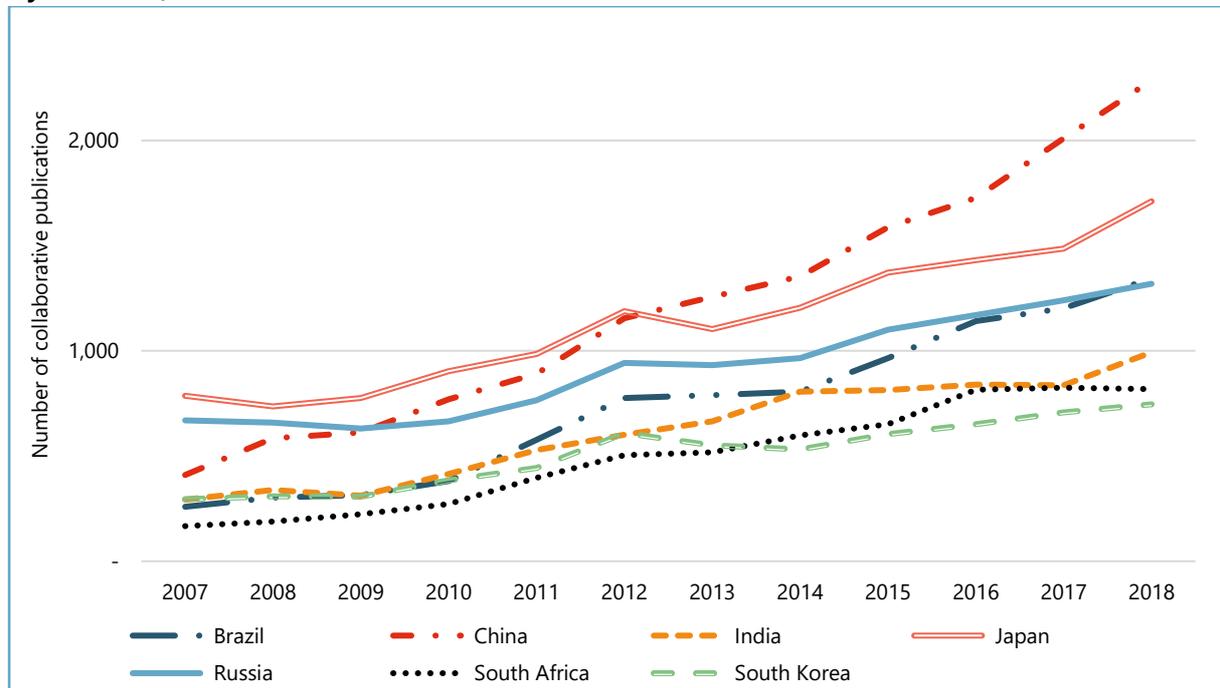


Source: Analysis based on the Scopus database

The figure reveals a noteworthy increase in the number of collaborative publications co-authored by Swiss researchers and researchers from other countries. Between 2007 and 2017, the approximate number of collaborative publications involving researchers from priority countries rose from 2,150 to 5,700 – a 166% increase over 10 years. In the same period, Switzerland experienced an increase in the number of collaborative publications co-authored with researchers from *any other* country (not just priority countries) of 88% (approximately 16,950 publications in 2007 rising to approximately 31,950 in 2017).

Figure 7.2 presents further detail of the development in cooperation with researchers from priority countries, as it shows trends for each of the seven countries.

Figure 7.2. Growth in the number of publications co-published with researchers from the seven priority countries, 2007-2017



Source: Analysis based on the Scopus database

The figure shows that in all of the priority countries, the number of collaborative publications involving Swiss researchers over the period 2007–2017 increased. Among the priority countries, China, over recent years, has produced the largest number of collaborative publications, followed by Japan, Brazil and Russia. Growth in the number of co-publications has been relatively high in South Africa, China and Brazil (360–400%). It has been more modest in Russia and Japan (80–90%). However, Russia and Japan had the highest number of collaborative publications among the seven priority countries at the outset (2007).

High levels of growth in research cooperation are not unique to Switzerland. On the contrary, international research cooperation is growing very fast globally,²⁸ and it is therefore of interest to compare the situation in Switzerland with that in other European countries.

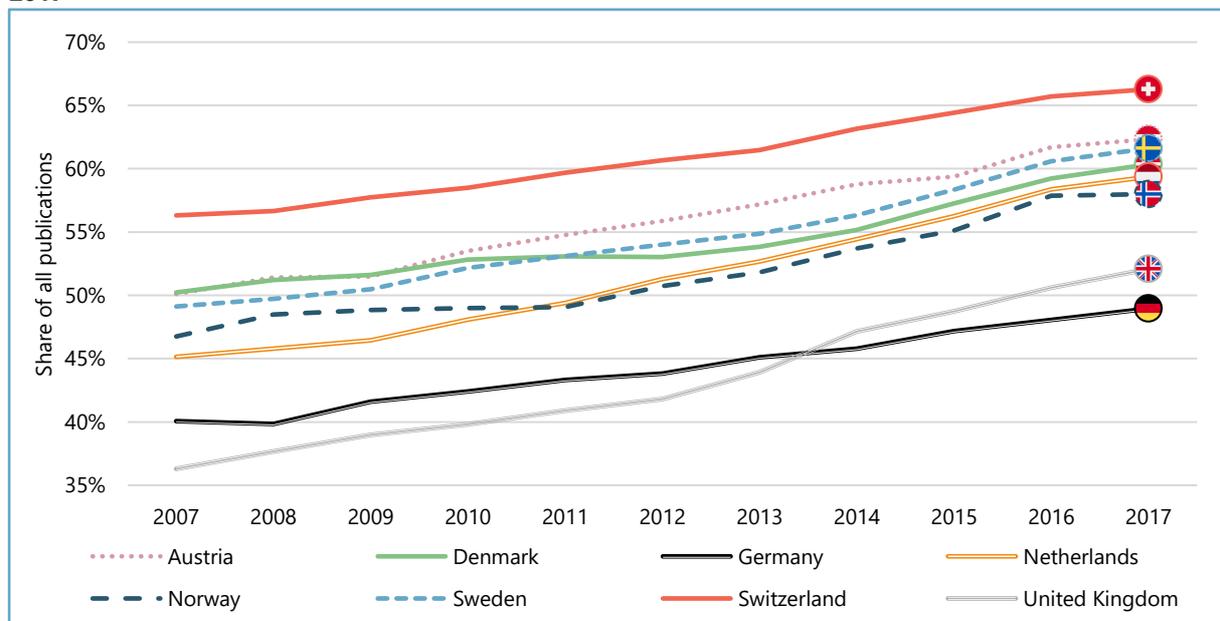
In what follows, we compare developments in international research cooperation in eight countries: Austria, Denmark, Germany, the Netherlands, Norway, Sweden, Switzerland and the United Kingdom. The seven countries beside Switzerland were selected because they share a number of common features:

- They are all performing well in international comparisons of research production/quality
- They all offer programmes stimulating bilateral research cooperation with countries outside the EU
- They all have a relatively high per capita GDP (sitting in the top 20 in the world)
- Most have a relatively small population, and Germany and the UK, which are larger, were included since they represent leading European economies.

²⁸ Ribeiro, L. C. et al. (2018): "Scientometrics". SERI (2018): "Switzerland's performance in scientific publications 2011–2015".

As a first step in the benchmark exercise, Figure 7.3 shows the growth in collaborative publications with *all* countries (not just priority countries) as a share of all publications, for Switzerland and for each comparison country in the period 2007–2017.

Figure 7.3. Growth in collaborative publications with all countries as a share of all publications, 2007-2017



Source: Analysis based on the Scopus database

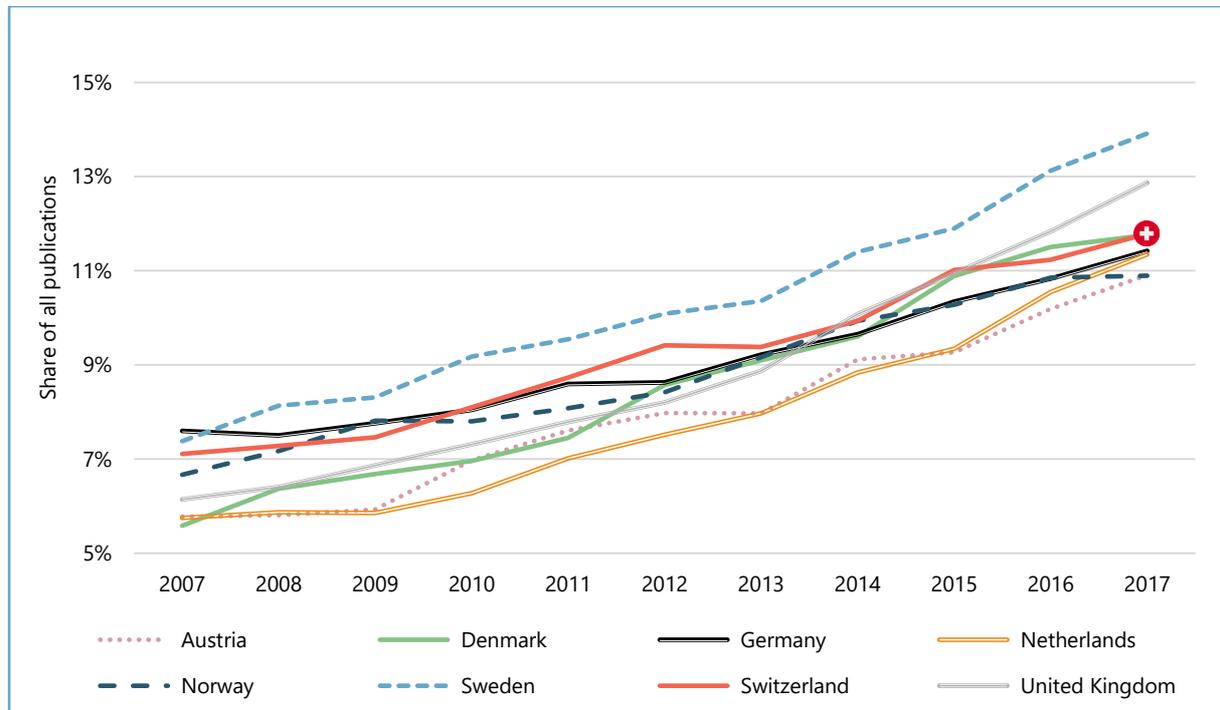
It can be seen that all of the countries experienced an increase from 2007 to 2017, and that Switzerland had the highest share in every year represented (although some countries have also narrowed the gap with Switzerland during the period). Switzerland's share in 2017 was about 66%. Thus two-thirds of all Swiss publications were prepared in collaboration with researchers from at least one foreign country.

The two large nations, the United Kingdom and Germany, have noticeably lower shares than the other nations. That may mean there are more domestic options for collaboration in larger countries.

The remaining non-Swiss nations – Austria, Denmark, the Netherlands, Norway and Sweden) had a markedly similar share in the whole period with the Netherlands experiencing the highest growth rate.

Figure 7.4 shows the growth in collaborative publications with researchers from *priority countries only* as a share of all publications, for Switzerland and for each comparison country in the period 2007–2017.

Figure 7.4. Growth in collaborative publications with priority countries as a share of all publications, 2007-2017



Source: Analysis based on the Scopus database

Again, the figure shows increases for all of the included countries. But the ranking here differs from that represented in Figure 7.3. Sweden has the highest share of publications co-authored with researchers from the priority countries, followed by the United Kingdom, which has experienced the highest growth during the period. Switzerland performed about average vis-à-vis the comparison countries in 2017, having been close to the top level in 2007.

Since the share of collaborative publications with *all* countries for Switzerland is very high, and the share of collaborative publications with *only the priority countries* is modest, it follows that the priority countries are involved in fewer research collaborations with Switzerland than the comparison countries.

7.3 Comparison with bilateral collaboration programmes being run in selected countries

In the following subsections, we compare the bilateral programmes in Switzerland with similar programmes in Denmark, Sweden and the UK, as these three countries have been particularly successful in increasing their collaboration with priority countries (see Figure 7.4).

7.3.1 Denmark

In Denmark, programmes promoting international research cooperation are supplied mainly by just two organisations:²⁹

²⁹ As in other countries, there are also a number of private funds and foundations supporting different types of cooperation with specific countries or within specific themes.

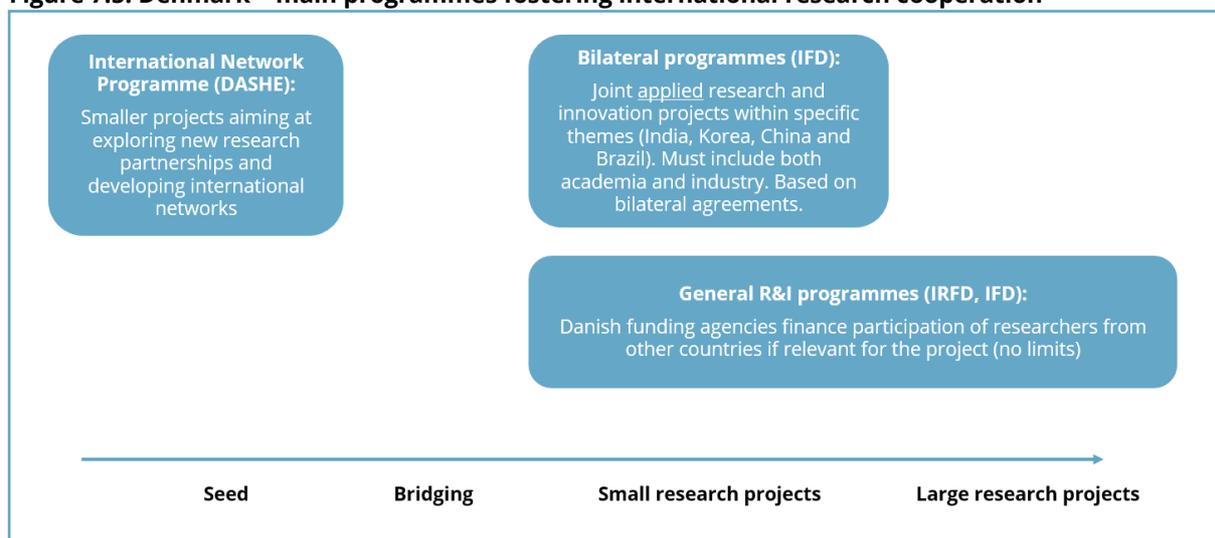
- The Danish Agency for Science and Higher Education (DASHE)³⁰ has offered grants under *the International Network Programme* since 2009. This programme seeks to provide increased opportunities for Danish researchers to create new networks and collaborations with researchers from a number of prioritised countries.
- Innovation Fund Denmark (IFD)³¹ offers bilateral programmes supporting applied research projects (within specific themes) carried out with partners in Brazil, China, South Korea and India. As in Switzerland, these programmes are based on bilateral agreements and principles of mutual/equal funding. However, the Danish projects, unlike the Swiss bilateral programmes, must include participants from both academia and industry.

It is an important feature of the Danish research and innovation funding system that the general research project grants supplied by the Independent Research Fund Denmark (IRFD) and IFD can include and finance partners from foreign universities.³² There is no upper limit, or other restrictions, on the participation of foreign partners in the research projects.³³

Thus, while the Danish research funds do not support bilateral programmes fostering basic research cooperation with specific countries, they do offer flexibility in terms of (unilateral) funding options for proposals developed in cooperation with researchers from foreign research institutions (at least, as long as the partnerships will benefit Danish research).

Figure 7.5 below summarises the main Danish programmes fostering research cooperation with non-EU countries, indicating their scope and aims. The activities are arranged along an axis from seed money (left) to the funding of large research projects (right), as in Chapter 2.

Figure 7.5. Denmark – main programmes fostering international research cooperation



Source: Desk research and interviews with programme managers

Note: DASHE=Danish Agency for Science and Higher Educations. IFD=Innovation Fund Denmark. IRFD=Independent Research Fund Denmark

³⁰ Sister organisation to SERI.

³¹ Sister organisation to InnoSwiss.

³² One of the evaluation criteria is that the projects will benefit Danish Research.

³³ In Switzerland, national programmes under SNSF can also fund foreign partners, but this funding cannot be above 20% of the total budget (see Chapter 3).

The figure shows that the International Network Programme, or DASHE, covers activities in the seed phase. The development of proposals for new research projects (the bridging phase) is not supported by any programmes in Denmark. As is the case in Switzerland, the bilateral programmes can be used to fund small research projects.

General R&I programmes include a number of funding schemes which can be used to finance both small and large research projects. And in most of the programmes supplied by IRFD and IFD funds can be used to finance the participation of foreign partners where it is relevant to a project.

Turning to the International Network Programme, this scheme contains several features that distinguish it from the programmes supplied by the Swiss LHs:³⁴

- While the aim, as in Switzerland, is to exchange knowledge and prepare joint research (or other long-term) activities, there is an explicit focus on exploring *new* research partnerships. Thus, the programme only supports the development of new networks. Partnerships with researchers who have co-published before are not eligible for funding, and “the exploratory nature of the network activities” is an important evaluation criterion.
- The programme is limited to seven non-European countries where research cooperation is supported by other means in Danish research and innovation policy (i.e. Innovation Centres³⁵ and the bilateral programmes supplied by IFD).
- Only proposals with a recognised, senior scientist as principal investigator are accepted.
- Unilateral funding. There is no requirement for co-funding from the priority countries, but the proposal must include an expression of interest from the partner country.

The first of these features signals that, in the International Network Programme, it is not only the potential of the idea that is taken into consideration: it is also important that the network and the activities in themselves are innovative and have long-term potential. One consequence of this is that the number of participating institutions and researchers here is considerably higher than it is in Switzerland. In all, 20% of the supported projects have more than two participating countries, and 70% have at least two participating institutions from the partner country.³⁶

The restriction to projects with senior researchers as principal investigators has to do with the aim of developing and managing bigger networks, and creating long-term partnerships. It also reflects an ambition to foster proposals with high research quality. The evaluation refers to scientific background and the level of scientific excellence among the participants (CVs, reference list, H-index, etc.) as well as the international rating of the foreign partner institutions. Experience in international scientific cooperation is also an important criterion.

The unilateral funding approach is motivated primarily by an ambition to keep the administrative cost of applying for the relatively small grants at a minimum. In addition, since the programme welcomes proposals with participants from two or more of the priority countries, it goes further than merely supporting bilateral projects, and the aim of supporting networks that are multinational or multi-institutional makes it even more complicated to demand co-funding from all partners.

³⁴ The bullet points are based on a reading of the call document and an interview with the programme manager.

³⁵ Sister organisation to swissnex.

³⁶ Graversen, E. K. et al. (2016): “Evaluation of International Network Programme 2009-2014”.

The International Network Programme supports activities of the same type as the Swiss LH grants (travel, workshops, conferences, accommodation, etc.).

The programme was evaluated in 2016, yielding the following main conclusions:³⁷

- A large proportion of the grants lead to co-publications (70%) and applications for research projects (75%).
- The programme further internationalises Danish research by, among other things, contributing to a large number of collaborative projects and co-publications.
- The programme delivers a unique funding option for the initiation and exploration of new networking and collaboration opportunities of all kinds.
- The programme successfully supports many of the grant recipients in establishing lasting networks with a high level of academic benefits.

One element of the evaluation of the Danish programme was a survey. The questionnaire did not contain specific questions about access to follow-up funding options. But only 20% disagreed, or partly disagreed, with the statement "There exists a positive synergy between the programme and other instruments in the research funding system". We interpret this as an indication that there are rather good follow-up funding options.

The largest share of the Danish researchers receiving follow-up funding are recipients of IRFD funding or other public research funds, according to the evaluation. But EU programmes also supply funding for large proposals based on ideas developed in the International Network programme.

As shown in Chapter 6, participants in the Swiss programmes seem to be more critical of the synergy in the Swiss funding system (53% disagree, or partly disagree, with the statement "There exist good follow up funding options").

There seem to be four potential explanations of the differences between Denmark and Switzerland we have outlined:

- The upper grant limit in Danish programme is a little higher (see Section 7.5) than that in the LH instruments, and this may encourage the development of more concrete ideas for research projects.
- It is easier to use the general, national research programmes to fund cooperative research proposals, since they have no upper limits on the funding of foreign partners. The Swiss 20% limit makes it difficult to fund ideas developed as part of an LH-supported project, since the ideas often assume equal contributions from the participating institutions.
- The frequency of calls for bilateral programmes in Denmark (typically, annual) is higher than the corresponding frequency in Switzerland.³⁸
- The Danish network programme focuses on countries where other instruments provide further support for research collaboration with Danish researchers.

³⁷ Ibid.

³⁸ Since the evaluation, the bilateral programmes have been restricted to applied research. This development might be reducing access to follow-up funding options.

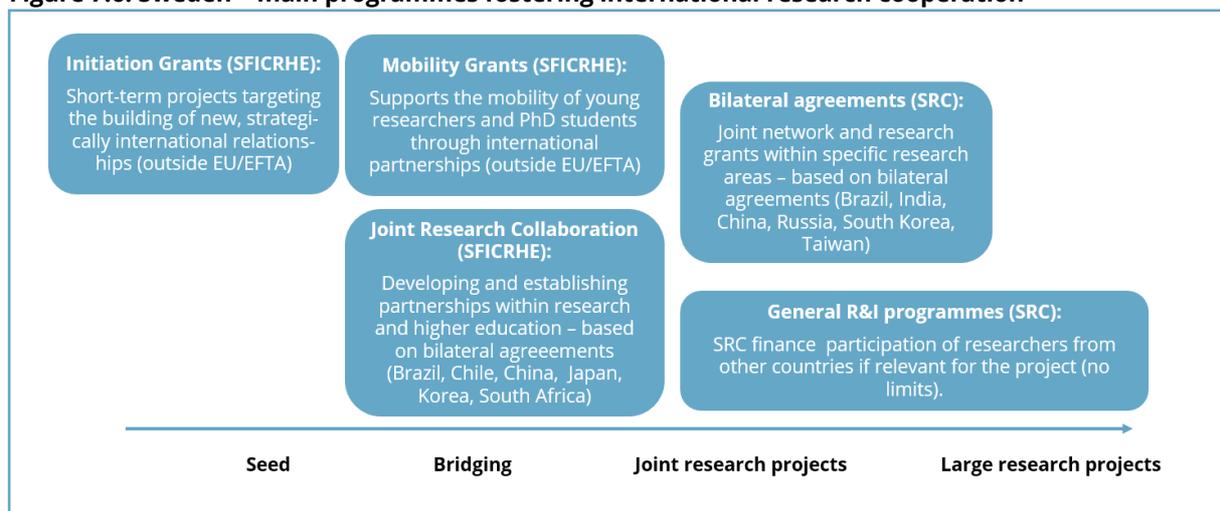
7.3.2 Sweden

As in Denmark, two major organisations in Sweden supply programmes fostering international research cooperation:

- The Swedish Foundation for International Cooperation in Research and Higher Education (SFICRHE) offers various types of grant that fund both the initiation of new networks and longer-term projects focusing on mobility and the development of partnerships among higher educational institutions.
- The Swedish Research Council (SRC)³⁹ provides bilateral programmes funding networks and research projects (within specific themes) carried out with partners in Brazil, China, Korea, India, Russia and Taiwan. As in both Switzerland and Denmark, the programmes are based on bilateral agreements and principles of mutual/equal funding.

The figure below offers an overview of the main programmes in Sweden, indicating their scope and aims.

Figure 7.6. Sweden - main programmes fostering international research cooperation



Source: Desk research and interviews with programme managers. SFICRHE: Swedish Foundation for International Cooperation in Research and Higher Education. SRC: Swedish Research Council

As the figure shows, SFICRHE is responsible for programmes in the seed and bridging phases.

The initiation grants are similar in many ways to both the Danish International Network Programme and LH research instruments in Switzerland. They fund short-term projects aiming to develop new networks and initial activities that may lead to research project proposals.

The agency also manages two programmes that cover activities designed to further long-term partnerships between higher educational institutions in Sweden and countries outside EU/EFTA: mobility grants and joint research collaboration.

The first of these, mobility grants, support projects intended to create and establish international partnerships for up to three years (maximum budget SEK 600,000). A corresponding level of funding from the foreign partners is required in this programme. The grants can be used for internationalisation activities such

³⁹ Sister organisation to SNSF.

as short and longer stays abroad,⁴⁰ and workshops, conferences and similar activities. The programme encourages partnerships with activities within both research and higher education, and it has a special focus on fostering international mobility among young researchers and doctoral students.

Thus, in many instances the programme supports activities very similar to those supported by the seed, bridging and mobility grants in Switzerland. On the other hand, the projects last longer, and the development of strong and lasting partnerships between the involved institutions is an important goal, as is the successful development of proposals for new research projects.

As regards the second programme, joint research collaborations are based on bilateral agreements with six different countries. The evaluation of applications is based on parallel evaluation processes undertaken in Sweden and the partner country. The maximum grant limits and the duration of the projects are the same as they are in the mobility grants. The programme also encourages partnerships that encompass both research and higher education activities (although pure research partnerships can also be supported), and it covers the same types of activities as the mobility grants.

In essence, mobility grants and joint research collaborations support the same kinds of activities. Both programmes emphasise the creation of new partnerships and new collaborative patterns, and indeed mobility grants can only be used to finance collaboration with universities in countries with whom Sweden does not yet have bilateral agreements. In both types of grant, proposals are evaluated against three criteria:

- Contribution to the relevant educational establishment's internationalisation
- Scientific quality and novelty
- Planning and support

Thus, looking across the three programmes here – the initiation grants, mobility grants and joint research collaboration – we can see that in Sweden the first stages of the funding chain (seed and bridging) contain the following characteristics:⁴¹

- The aim of the programmes is to develop new and strategically interesting international partnerships in research and education. Important evaluation criteria include visions for long-term partnerships and whether the grants will lead to new and broader partnerships.
- Contributions to both research and educational activities are encouraged.⁴²
- The programmes give high priority to projects involving young scientists (unlike the Danish International Network Programme which focuses on senior researchers).
- The programmes represent a mix of unilaterally (the initiation grants⁴³) and bilaterally funded projects. Moreover, while two of the programmes cover all countries outside EU/EFTA, the JRC programme is based on bilateral agreements.

⁴⁰ Besides travel expenditure and accommodation, the programme finances salary costs for stays abroad of up to six months a year for doctoral students and postdoctoral researchers.

⁴¹ The following bullets are based on a reading of the call document and an interview with the programme manager.

⁴² An evaluation from 2019 found that only a small percentage of applications have a purely educational focus.

⁴³ The main arguments are 1) that bilateral funding procedures are too cumbersome given the grant sizes, and 2) that there are only modest opportunities for funding in many countries outside EU/EFTA.

The main reason for the Swedish focus on young researchers and doctoral students is the presumption that alternative funding options are more limited in this group – meaning the value added by receipt of a grant is higher among young researchers.

The focus on educational activities reflects, among other things, the assessment that educational activities are important for the development of strong partnerships across universities.

As regards the bilateral research agreements (located in Figure 7.6 to the right, where joint and large research projects come into play), the Swedish Research Council has such agreements with six countries outside the EU: Brazil, China, India, Russia, South Korea and Taiwan. The programmes typically issue thematic calls once a year, with the evaluation and administration being handled jointly by the Swedish Research Council and the funding agency in the partner country. The maximum grant is 1 million SEK per annum for researchers on the Swedish side.

The programmes cover research projects carried out in collaborations between researchers from at least one university in each country (like the JRP in Switzerland).

In the general research funding programmes the Swedish Research Council accepts and finances foreign partners. As in Denmark, there is no upper limit on the share of funding distributed to foreign partners, but overhead costs can only be covered in Swedish research institutions.

7.3.3 The United Kingdom

In 2018, the British research and innovation system underwent major change with the establishment of UK Research and Innovation (UKRI). Operating across the whole of the UK, UKRI brought together seven research councils, Innovate UK and Research England – all formerly separate institutions funding research and innovation in the UK.

In the new, centralised setup, funding opportunities for international cooperation across the seven research councils,⁴⁴ Innovate UK and Research England have been categorised into four stages:

1. First links
2. A broader relationship
3. Pilot studies
4. Sustainable interactions

Each stage contains between 7-19 individual schemes, of which a few are restricted to collaborations with European countries and the US. Most schemes extend worldwide, but some are limited to specific countries (e.g. the “Partnering Award Scheme” offered by the Biotechnology and Biological Sciences Research Council (BBSRC) with a specific focus on China, India, Japan and the US).

The four-stage taxonomy was developed to facilitate integration across the formerly separate research councils. It was intended to present the programmes and schemes in a researcher-oriented way. However,

⁴⁴ The seven councils are: Arts and Humanities Research Council (AHRC); Biotechnology and Biological Sciences Research Council (BBSRC); Economic and Social Research Council (ESRC); Engineering and Physical Sciences Research Council (EPSRC); Medical Research Council (MRC); Natural Environment Research Council (NERC); Science and Technology Facilities Council (STFC).

UKRI is currently looking at opportunities to streamline and standardise across the councils. It is anticipated that changes will be evolutionary and incremental over the next few years.

In recent years, there has been a growing focus on boosting international research and innovation cooperation in the UK. The direction has been towards working in partnerships within the international development research sector to support the development of people, communities, universities, businesses and governments in low and middle-income countries in Africa, Asia and South America. Thus, two of the three recently established funds have a distinct focus on promoting “fair and equitable partnerships”.⁴⁵

- The Newton Fund was launched in 2014 to promote economic development and social welfare in 17 active partner countries. In total, GBP 735 million will be invested by 2021 through **bilateral** agreements with partner countries providing matched funding. The Newton Fund is part of the UK's Official Development Assistance (ODA), and partner countries are all on the DAC (Development Assistant Committee of the OECD) list of ODA-eligible recipients.⁴⁶
- The Global Challenges Research Fund (GCRF) was announced in late 2015 to support cutting-edge research addressing the challenges faced by developing countries. The GBP 1.5 billion fund also forms part of the UK's ODA commitment and supports **unilateral** research projects. GCRF is one of the most significant funds supporting researchers outside the UK. In it, there is no cap on the proportion of funding that can be used to support researchers based in DAC countries – examples already exist with funding up to approximately 90%.⁴⁷
- The Fund for International Collaboration (FIC) is a non-ODA fund of GBP 110 million over three years announced in late 2017. FIC aims to enhance the UK's excellence in research and innovation through global engagement, forging new **bilateral** and multilateral research and innovation programmes with global partners. Partner countries under FIC include the US, Canada, Japan, Australia, Israel, South Korea, Singapore, China and India. The first round of FIC calls was announced in January 2019 and included mutually funded projects with collaborators from all partner countries.

The three funds are delivered by UKRI, which develops and runs calls, and then allocates and manages the money that it receives from the funds.

The figure below provides an overview of the four stages and three funds available in the UK to foster international research cooperation.⁴⁸

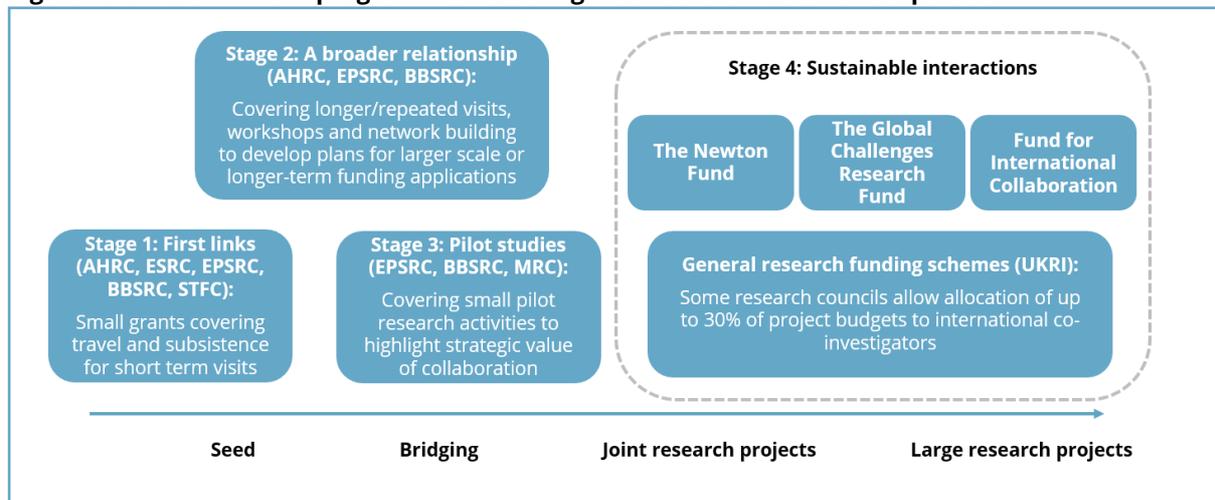
⁴⁵ For principles and recommendations to improve policy and practice towards “fair and equitable partnerships”, see Rethinking Research Collaborative (2018): “Promoting Fair and Equitable Research Partnerships to Respond to Global Challenges”.

⁴⁶ Partner countries are: Brazil, Chile, China, Colombia, Egypt, India, Indonesia, Jordan, Kenya, Malaysia, Mexico, Peru, the Philippines, South Africa and wider Africa, Thailand, Turkey and Vietnam.

⁴⁷ In comparison with the Swiss SPIRIT programme offered by SNSF, at least 30% of each SPIRIT grant must be allocated to Switzerland and at least 30% to the relevant partner country/countries.

⁴⁸ Many of the schemes provided by the research councils are not limited to non-EU/EFTA countries. They are open for collaborations across the globe. The UK supports other international activities not covered by the figure – for example, international subscriptions and facilities which allow researchers to work internationally and access international facilities.

Figure 7.7. The UK – main programmes fostering international research cooperation



Source: Desk research and interviews with programme managers. AHRC: Arts and Humanities Research Council. BBSRC: Biotechnology and Biological Sciences Research Council. ESRC: Economic and Social Research Council. EPSRC: Engineering and Physical Sciences Research Council. MRC: Medical Research Council. STFC: Science and Technology Facilities Council. UKRI: UK Research and Innovation

The programmes categorised in stages 1-3 offer small grants to cover travel expenses, short visits, workshops, network building and pilot studies. Most allow collaboration with any country, and the schemes are open for applications at all times. The goal is to establish new relationships and strengthen existing ones in order to pave the way for potential joint research activities. The schemes are largely similar to the Swiss LH instruments, but they are offered only by some research councils and consequently not all of them are available in all fields of research. Furthermore, scheme designs vary between councils. For example, the Overseas Travel Grants offered by EPSRC cover salaries and indirect costs in addition to travel and subsistence expenses, while the BBSRC International Travel Award Scheme is limited to travel and subsistence costs. As mentioned, UKRI is currently looking at opportunities to streamline and standardise schemes across the councils. The schemes offered in stages 1-3 do not require matched funding from a partner country.

In stage 4, three funds support sustainable interactions between British researchers and scientific environments abroad. Two form part of the UK's ODA commitment and have a distinct focus on promoting fair and equitable partnerships, while the third (FIC) emphasises only excellence in research and innovation.⁴⁹ FIC partnerships are identified by the research councils and reflect areas of mutual interest and opportunity. The Newton Fund is based on a government-to-government commitment to research and innovation partnerships. This then enables national research and innovation agencies in two countries, as well as other relevant partners (e.g. national academies) to develop joint programmes and then jointly fund collaborative projects. Newton partner countries tend to be middle-income countries, with both research capability and funding institutions, and a strong desire to strengthen their economy/societies through research.

Finally, it is important to note that the general funding schemes offered by some of the research councils allow international co-investigators to be included. The councils are currently discussing a common approach to international co-investigators. They have already agreed to a harmonised approach for international co-investigators in projects funded by the Global Challenges Research Fund.

⁴⁹ Switzerland is also offering instruments to support research that contributes to bilateral relations in developing countries. Examples of programmes are R4D and SPIRIT (see Figure 2.3 in Chapter 2).

7.4 Comparison of programmes

The seed and bridging phase

In Table 7.1, we compare the programmes and grants in the seed and bridging phases on a number of indicators, including budget (calculated in CHF), grant limits, call frequency, target groups, supported activities and evaluation criteria. The Swedish programmes are split into two groups, since they differ with regard to limits and criteria.

Table 7.1. Benchmarking of programmes in the seed and bridging phases

| | Seed, mobility and bridging grants (CH) | Initiation Grants (SE) | Mobility grants and joint research collaboration (SE) | The international network programme (DK) | Stage 1-3 (The UK) |
|---|---|---|---|---|---|
| Total annual budget (excl. administration) | CHF ~3.2m | CHF ~0.53m | CHF ~2.6m | CHF ~1.49m | N/A |
| Grant limits | CHF 10,000-25,000 | CHF ~16,000 | CHF ~63,000 | CHF ~30,000 (plus overhead) ⁵⁰ | Varies between Councils – some grants have no upper limit |
| Co-funding from partner country required | Yes | No | Yes (only JRC) | No | No |
| Frequency of calls | Varies (annually in most cases) | Four times a year | Annually | Annually | Varies - some are call-based others are always open to applications |
| Supported activities | Travel costs, accommodation, workshops/ conferences, facility use etc. | Travel costs, accommodation, workshops/ conferences, salary for young researchers (staying abroad) | Travel costs, accommodation, workshops/ conferences, salary for young researchers (staying abroad) | Travel costs, accommodation, workshops/ conferences, costs related to guest stays | Travel costs, accommodation, workshops, venue and equipment hire. Salaries can be covered in some cases |
| Duration of projects | Up to 1 year | Up to 1 year | Up to 3 years | Up to 2 years | Varies - some grants have no upper limit |
| Special target groups | Varies | Young researchers | Young researchers | Senior researchers as principal investigator | No |
| Geography | Asia, Africa, Latin America, Russia/ CIS, Middle East | Non-EU/EFTA | Non-EU-EFTA / Brazil, China, India, Russia, South Korea, Taiwan | China, India, Israel, Japan, US, Brazil, South Africa, Korea | Worldwide |
| Important criteria | Scientific merit Anticipated research outcome Potentials for further collaboration Reasons for bilateral cooperation Originality/feasibility Mobility of young researchers | Link to international strategies Expected outcomes New networks with long-term vision Project organisation and quality Both established and new researchers | Scientific quality and novelty Contribution to internationalisation of higher education institutions Planning and support | Exploratory nature of the network Scientific quality of participants Potential for further collaboration Experience in international cooperation | Scientific quality Added value and synergy Balance of participation |
| Operators | Universities (Leading Houses) | National foundation | National foundation | National agency (part of ministry) | National research councils |

Source: Desk research and interviews with programme managers

⁵⁰ Universities are granted 44% of the total amount applied for to cover administration expenses.

The figure shows that although a number of similarities can be identified across the programmes, they also differ in significant respects.

When population size is taken into consideration, the annual budgets in Switzerland, Sweden and Denmark are at almost the same level. However, grant limits differ across the programmes, with Sweden allowing bigger projects with a longer time frame than those in Switzerland. The UK offers grants with no upper limits on grant size and project duration.

Setting aside the joint research collaboration programme in Sweden (which is also based on bilateral agreements), Switzerland is the only country requiring co-funding from partner countries in the seed and bridging phases. In the other countries/programmes, only written expressions of interest from partner institutions are demanded in the applications.

In general, the programmes cover the same types of cost. But in addition to travel costs, accommodation, workshops, and so on, two of the Swedish programmes also cover salaries for young researchers up to three months in the period they stay abroad. Salaries can also be covered in some instances within the UK programmes.

The Swiss programmes and the Swedish initiation programme are the most restrictive when it comes to duration of the projects (up to one year). Since a new Swedish evaluation from 2019 recommends that STINT should allow funding to be used for a longer period, it is likely that the Swiss grants will have shortest time frames from 2020.

Another difference relates to the evaluation criteria for the programmes. In the Swiss seed and bridging grants, these criteria are typically designed so that the evaluation of the project idea and the possible impact of the project receive most attention. The scientific background, the anticipated research outcome and the reasons for collaborating are thus important criteria.

In the benchmark countries, more emphasis is generally put on the exploratory nature of the network and the long-term vision of the partnerships. This is especially true of Sweden and Denmark – the aim of developing long-term networks is one of the reasons why educational activities are encouraged in the Swedish programmes. It is expected that educational cooperation will often lead to long-term relations, since it involves more people and more commitment than is found in pure research projects.

As regards geographic coverage, only Denmark focuses on a small number of partner countries. The other countries, including Switzerland, supply programmes funding collaboration with most of the countries outside Europe.

Bilateral research projects

Table 7.2 provides an overview of the most important instruments in the four countries for funding joint research projects with researchers in priority countries.

Table 7.2. Benchmarking of Joint Research Projects

| | CH | SE | DK | UK |
|--|---|---|--|--|
| Specific instruments | Joint Research Projects | Joint Research Collaboration | Bilateral programmes | Fund for International Collaboration |
| Approximately total budget (annually) excl. administration | CHF ~ 8,5m | CHF ~ 2,4m | CHF ~ 6.0m | CHF ~ 100m |
| Maximum grant size (typical) excl. funding from partner country | CHF 250.000-350,000 | CHF ~ 316,000 | CHF ~ 448,000 | CHF 0,6-14m |
| Funding from partner country | Equal funding | Equal funding | Equal funding | Equal funding |
| Max. duration of projects | 3-4 years | 3 years | 3 years | No limit |
| Frequency of calls (for each country) | Every 3-4 years | Annually | Annually | Biannually ⁵¹ |
| Partner countries | Argentina, Brazil, China, India, Japan, Russia, South Korea, South Africa | Brazil, China, India, Russia, South Africa, South Korea, Taiwan. | Brazil, India, China | US, Canada, Japan, Australia, Israel, South Korea, Singapore, China and India |
| Special focal areas and target groups | Specific themes | Specific themes | Specific themes. Participation of companies required. | Inter/multidisciplinary bids are encouraged but this is not an essential criterion |
| Important criteria | Scientific relevance Track record and expertise of researchers Originality of the aims and objectives Complementarity of the research partners | Scientific quality and novelty Link to internationalisation strategies and ongoing research and education Opportunities for young researchers and doctoral students | Scientific quality Industrial perspective Evenly distributed activities Synergy with ongoing research | Quality of research and innovation Commitment from International partners Additionality (to existing Council activities) Alignment with government/UKRI international goals |
| Operator | SNSF | Swedish Research Council | Innovation Fund Denmark | UKRI |

Source: Desk research and interviews with programme managers

As the table shows, there are strong similarities across the programmes and countries (especially where Switzerland, Sweden and Denmark are concerned). Thus, the programmes differ only marginally in respect of grant limits, project duration, the focus on selected countries and specific themes in calls, and evaluation criteria.

The most striking remaining differences pertain to:

- The total budgets (very high in the UK and low in Sweden, when size of population is taken into consideration).

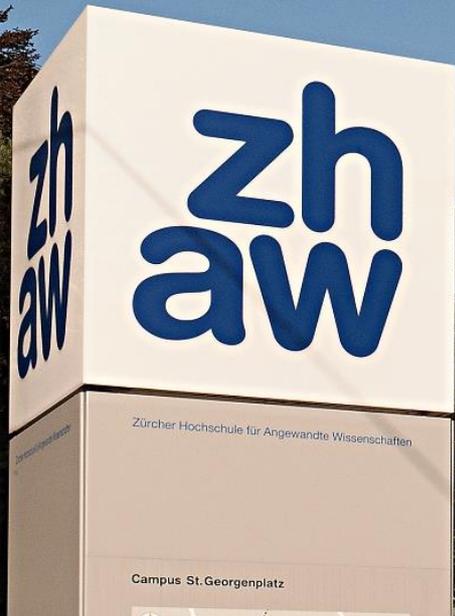
⁵¹ The first two rounds were run approximately six months apart with similar levels of investment.

- The low frequency of calls in Switzerland (but a higher number of supported projects in each call due to higher budgets per call).
- The emphasis by SNSF on complementary research competencies in partner institutions: the UK, Denmark and Sweden give more attention to internal synergies (i.e. links to international strategies and ongoing research).

It is, of course, important to note that the conditions for financing joint/bilateral research ideas under the general research funding schemes are better in Denmark, Sweden and, for some Councils, the UK than they are in Switzerland, as in the former there is no upper limit for the share of funding that can be allocated to researchers abroad. (Recall that a maximum 20% of the project budget can be allocated to foreign partners in the SNSF general research funding programmes.) The low budget for the joint research collaboration programme in Sweden needs to be seen in this light.

Zurich University of Applied Sciences (ZHAW)

Leading House for South Asia and Iran



Appendix - Data sources

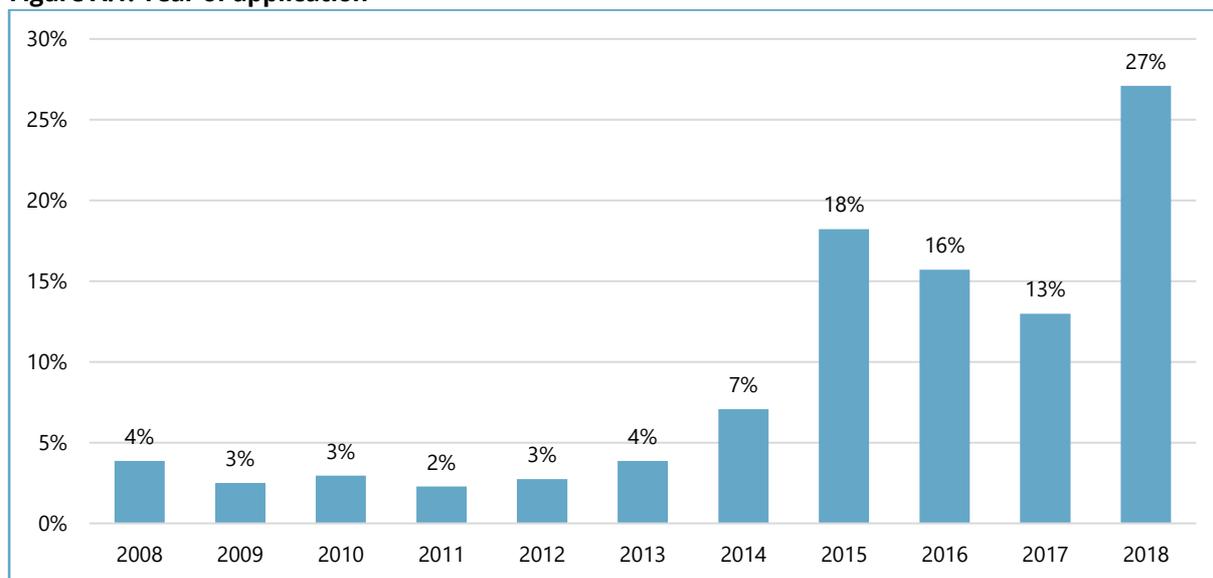
Survey details

Based on lists of applicants and grant recipients in the bilateral programmes obtained from SERI and the LHs, a database of 3,250 entries was constructed. It was found that 2,785 email addresses could be generated from the names of the people in the list, as the Swiss universities use a standardised form of email address using first and last name, and university. It is estimated that approximately 1,500 of these were unique (as many researchers participated several times in different programmes) and valid. As such, the 439 responses to our survey represent an estimated response rate of 29%.

The first batch of survey invitations was distributed on 16 May 2019 to 2,043 people. Approximately 500 email addresses turned out to be invalid, and around 50 people stated that they had in fact not applied or participated in the bilateral programmes. On 28 May 2019, we sent out 1,177 follow-up emails encouraging potential respondents to fill out the survey, and on 11 June 2019 another 267 people received follow-up emails. The survey was closed on 6 June 2019.

Below follow some background statistics on the 439 respondents who completed the survey.

Figure A.1. Year of application



Note: N=439

Figure A.2. Grant type (all types in survey)

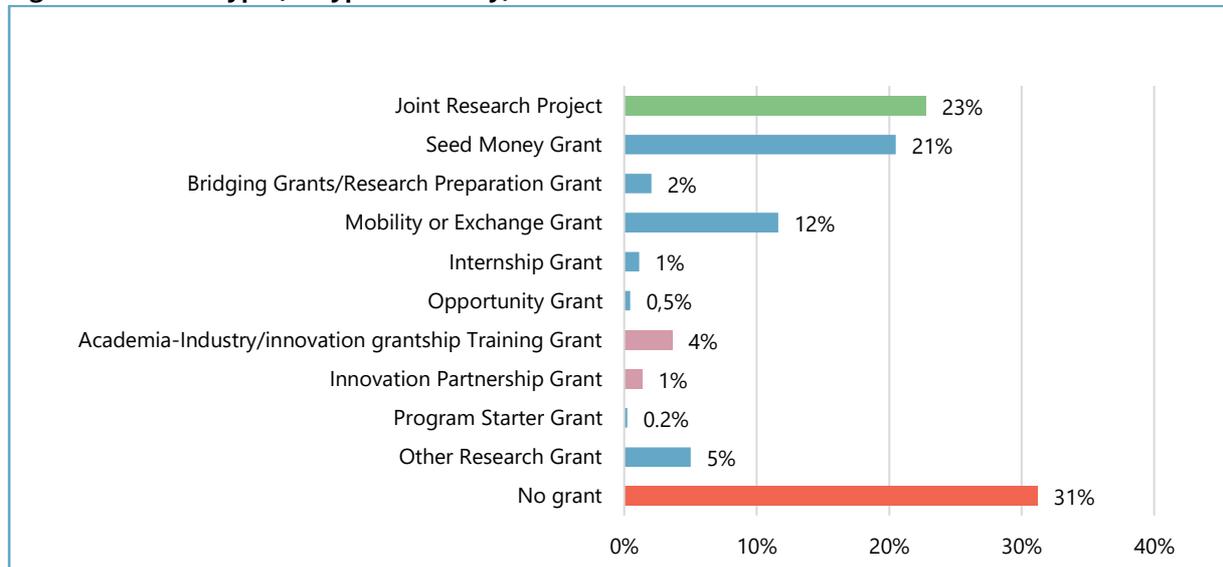


Figure A.3. Grant category (categorisation of the grant types)

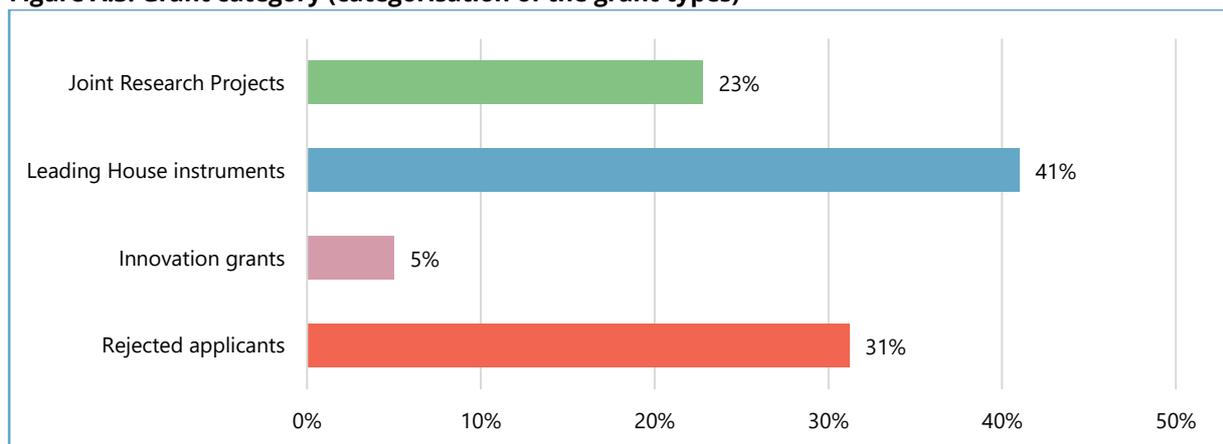


Figure A.4. Partner country in project/proposal (all types in survey)

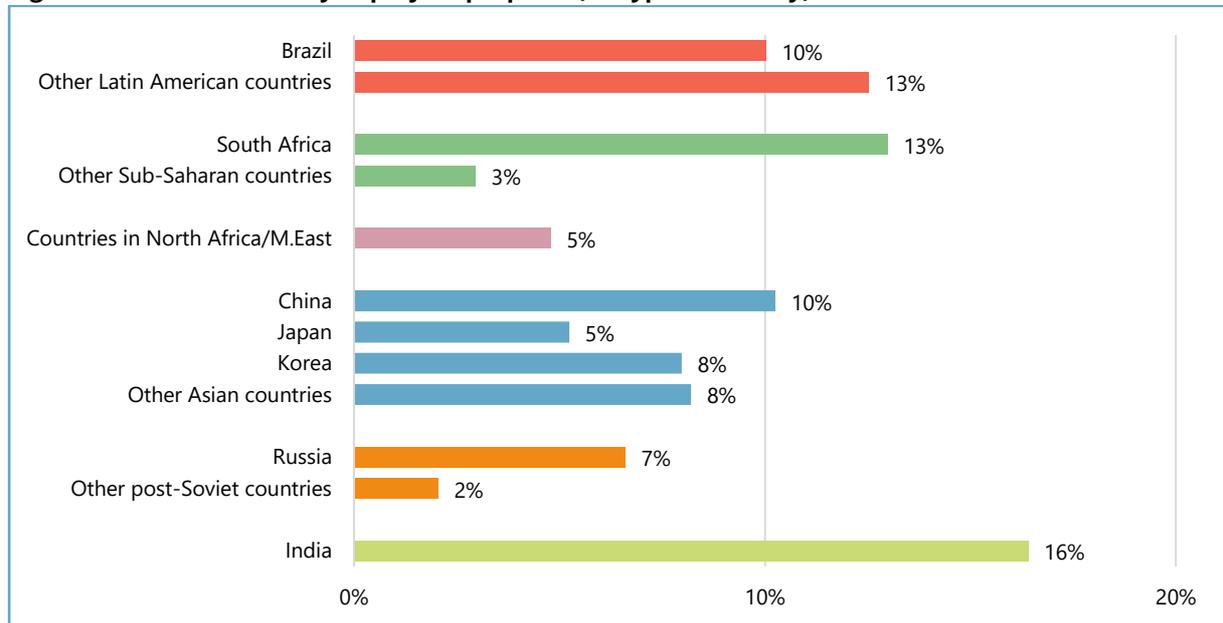


Figure A.5. Partner region (categorisation of the partner countries)

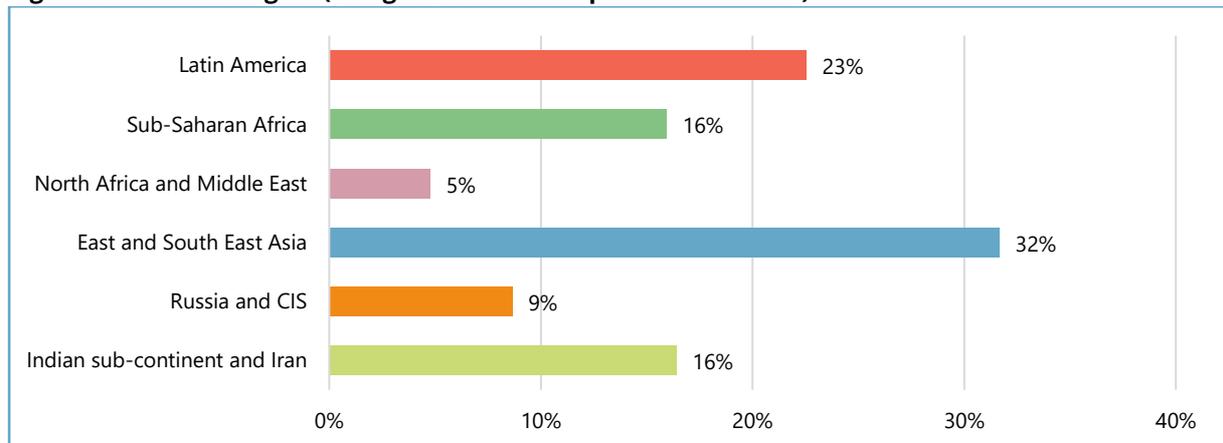


Figure A.6. Type of organisation of employment

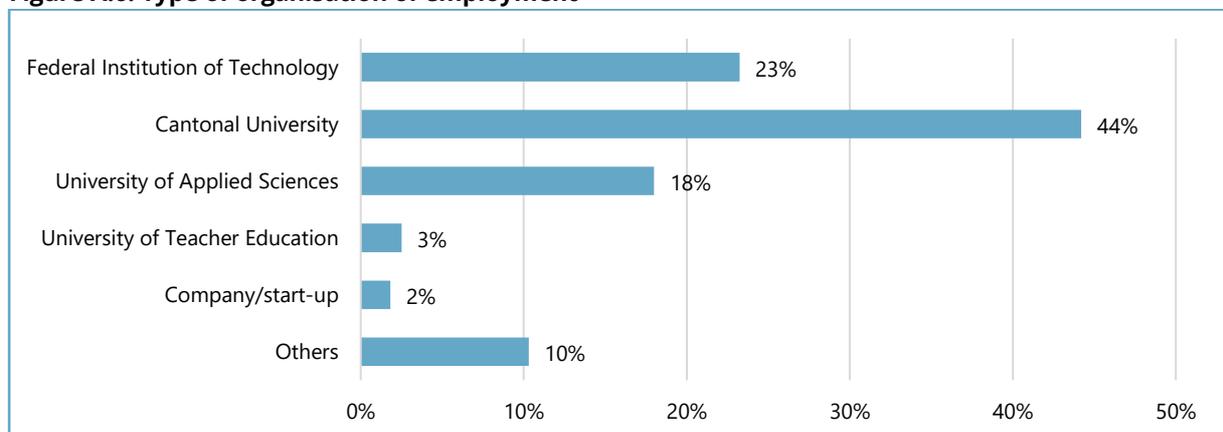


Figure A.7. Position of employment (all types in survey)

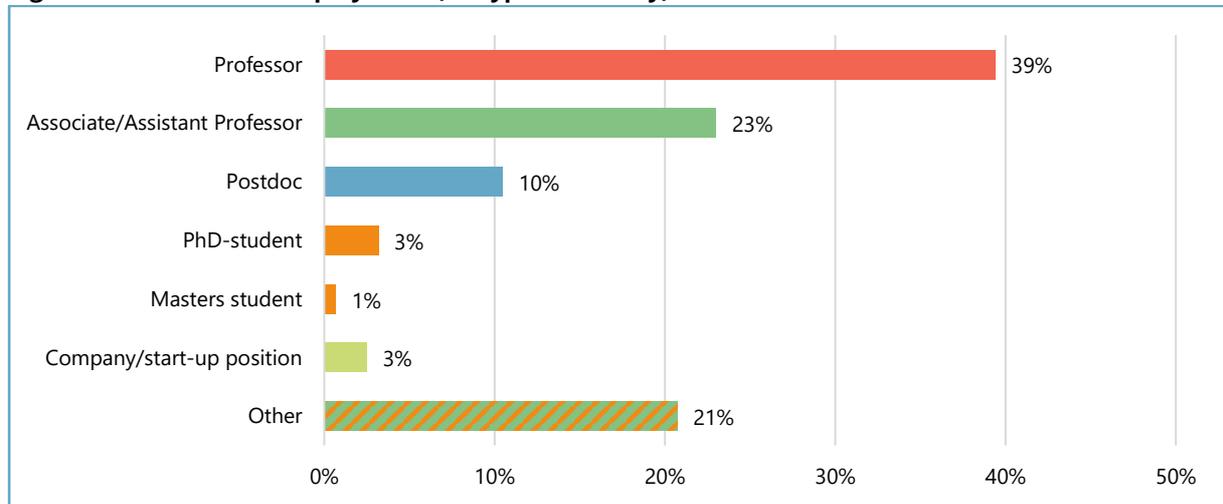


Figure A.8. Employment category (categorisation of the positions of employment)

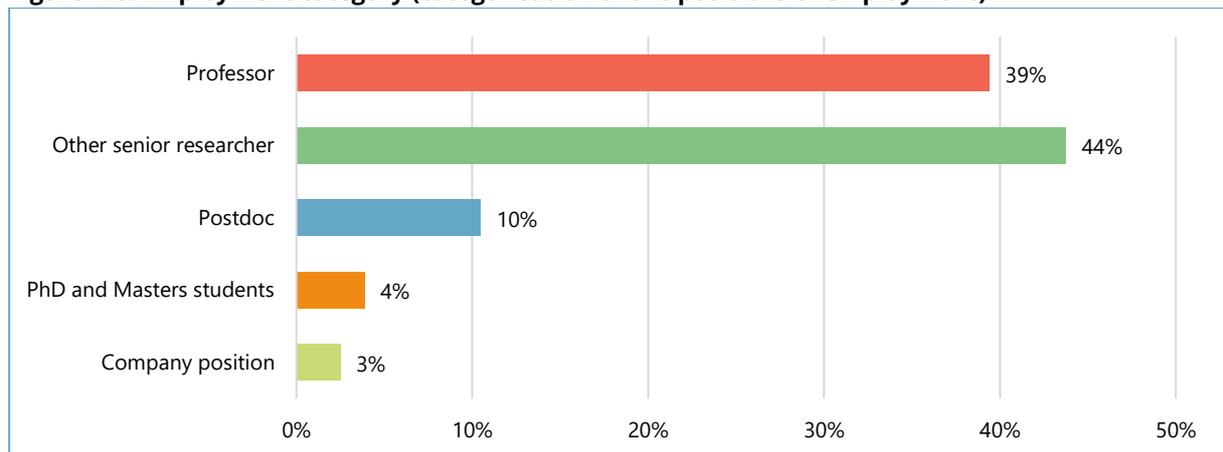
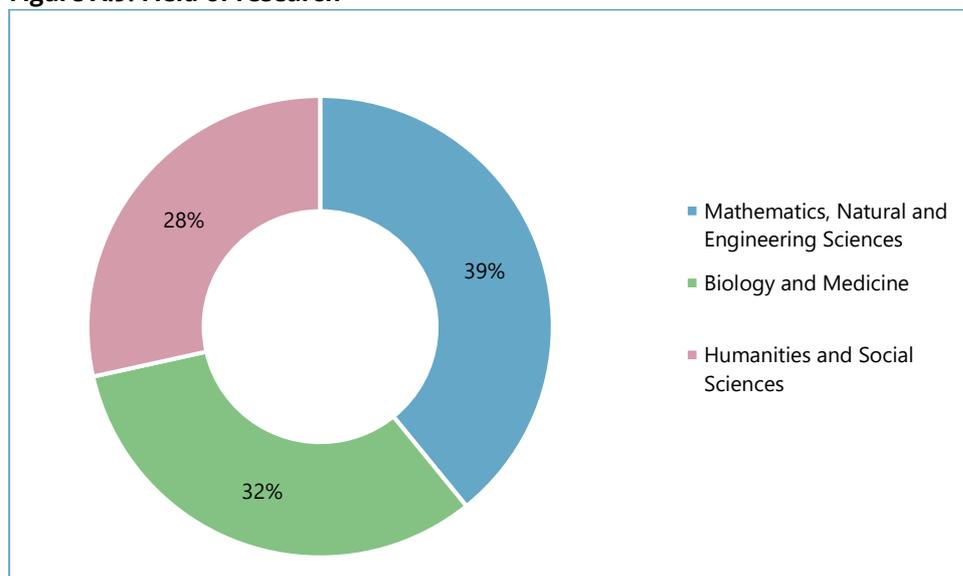


Figure A.9. Field of research



Interviews

Interviews were carried out with all current and former Leading Houses and associate Leading Houses, as well as SNSF, and with two high-level representatives from Swiss universities. We also interviewed representative from swissnex/science counsellors in South Africa, China, South Korea and Brazil in order to obtain their input on how the programmes are performing in these countries, and to understand how they contribute to the programmes.

A total of 26 researchers were interviewed for the analysis. They were widely spread in terms of institution, grant year and partner region/country. Statistical data on the interviewees are given in the tables below.

Table A.1. Researcher interviewee statistics – institution and grant year

| Institution | No. of interviewees | Grant year | No. of interviewees |
|-------------------------|---------------------|------------|---------------------|
| EPFL | 3 | 2008 | 1 |
| ETHZ | 1 | 2009 | 1 |
| HES-SO | 2 | 2010-11 | 0 |
| Paul Scherrer Institute | 2 | 2012 | 1 |
| Uni Geneva | 1 | 2013 | 4 |
| UNIBAS | 3 | 2014 | 1 |
| UNIL | 5 | 2015 | 3 |
| UNINE | 2 | 2016 | 4 |
| University of Zurich | 4 | 2017 | 2 |
| Other | 3 | 2018 | 9 |

Table A.2. Researcher interviewee statistics – region/country

| Institution | No. of interviewees |
|-----------------------|---------------------|
| ASEAN | 1 |
| Brazil | 2 |
| Brazil + India | 4 |
| China | 3 |
| India | 1 |
| Korea | 1 |
| Latin America | 2 |
| Other Asian countries | 1 |
| Russia | 1 |
| South Africa | 3 |

Bibliometric analysis

The objective of the bibliometric analysis was to compare the numbers of co-publications involving selected developing countries in a number of developed countries, including Switzerland. The data used in the analysis is mined from the SciVal database, which covers most of the world's scientific journals and research institutions. The data types are:

- The number of collaborative publications prepared together with researchers in Brazil, China, India, Japan, South Korea, Russia and South Africa, for each of Austria, Denmark, Germany, the Netherlands, Norway, Sweden, Switzerland and the United Kingdom, in the period 2007–2017, and in some instances in the period 1996–2018. This was done for each individual permutation, and as a total for all countries in each group, and on a year-by-year basis.
- The number of collaborative publications with any country for all countries mentioned above in the periods mentioned above.
- The number of publications for all countries mentioned above in the periods mentioned above.

The numbers are presented in different ways at different points in the bibliometric analysis. In Figures 7.1 and 7.2, the real numbers are shown.

In Figures 7.3 and 7.4, percentages of collaborative publications as a share of all publications are shown.

The calculations here are: $\frac{\text{No. of collaborative publications (with all or priority countries)}}{\text{No. of all publications}}$.

In Figure 7.5, percentages of collaborative publications with priority countries as a share of all collaborative publications are shown. The calculations here are: $\frac{\text{No. of collaborative publications with priority countries}}{\text{No. of collaborative publications with all countries}}$.

In Figure 7.6, the numbers of collaborative publications with priority countries are indexed with reference to year 2007. The calculations here are: $\frac{\text{No. of collaborative publications with priority countries for year } X}{\text{No. of collaborative publications with priority countries for year 2007}} * 100$.

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