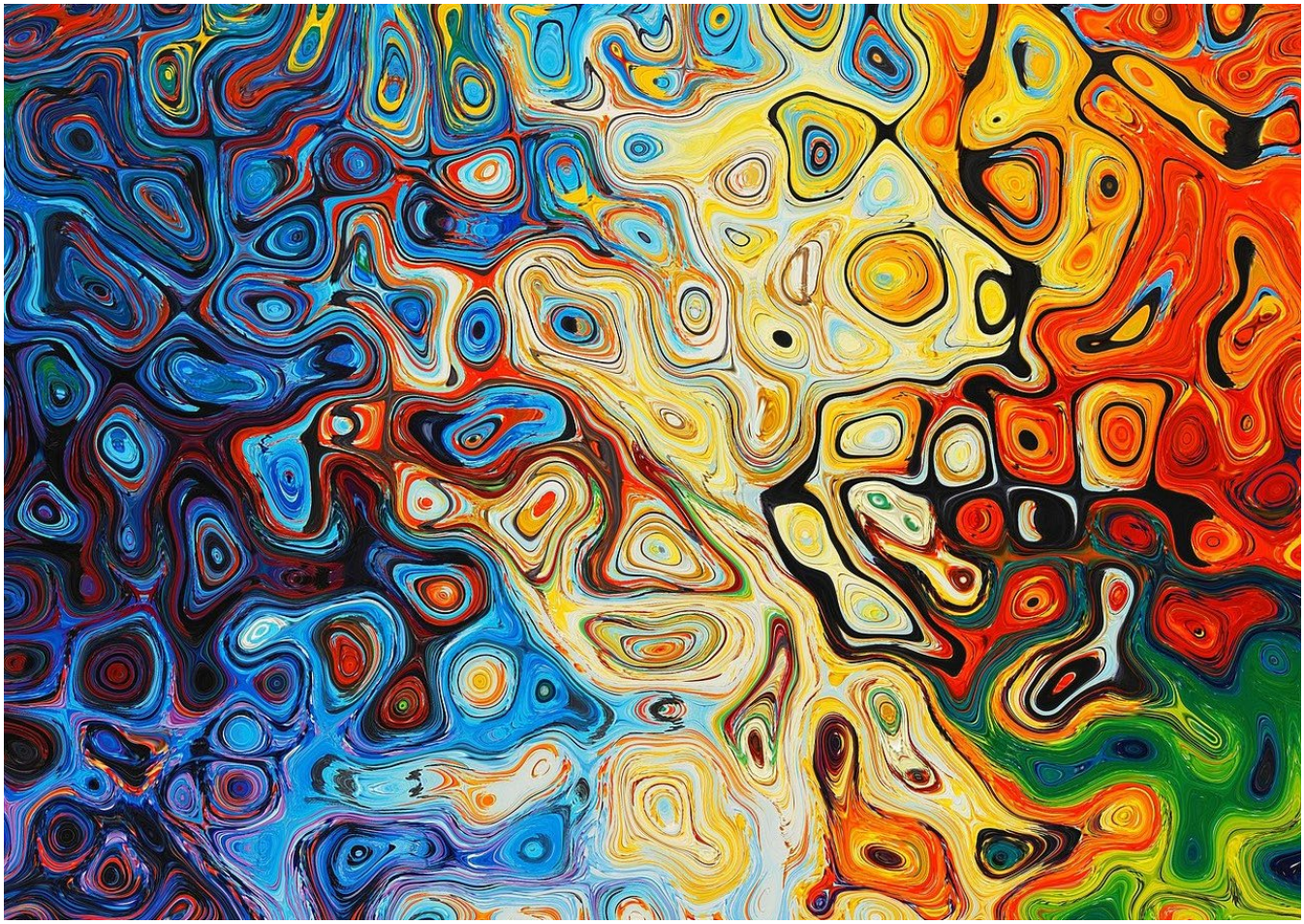


Project “New innovation models in Switzerland”
Sector brief: Chemicals, pharmaceuticals and biotechnology sector

Martin Wörter & Anastasia Schenckery, ETH-KOF
Franz Barjak & Fabian Heimsch, FHNW
Benoit Cornet, University of St. Gallen
Dominique Foray, EPFL
02 March 2026

Contact:
Martin Wörter
ETH Zürich
KOF Konjunkturforschungsstelle
LEE F 111
Leonhardstrasse 21
8092 Zürich
Phone +41 44 632 51 51
Email: woerter@kof.ethz.ch

Table of contents

Disclaimer

The report has received data and opinions on various topics from a number of individuals and organisations in Switzerland and was financed by public and private funds. However, the authors wish to emphasise that all statements were made independently drawing on the empirical work and with the utmost scientific rigour applied. The opinions and interpretations in the report are those of the authors and not those of the sponsors and funders, and any errors are solely attributable to the authors.

This report is one of a series of reports from the "New innovation models in Switzerland" project. The other reports are:

Barjak, F., Heimsch, F., Cornet, B., Foray, D., Wörter, M. & Schenckery, A. (2026). *New innovation models in Switzerland. Report on behalf of the Swiss State Secretariat for Education, Research and Innovation (SERI).* Link [Main report]

Barjak, F., Heimsch, F., Cornet, B., Foray, D., Wörter, M. & Schenckery, A. (2026). *Project "New innovation models in Switzerland". Sector brief: Medical technologies.* Link

Barjak, F., Heimsch, F., Wörter, M. & Schenckery, A., Cornet, B., Foray, D. (2026). *Project "New innovation models in Switzerland". Sector brief: Information & Communication Technologies (ICT).* Link

Cornet, B., Foray, D., Barjak, F., Heimsch, F., Wörter, M. & Schenckery, A. (2026). *Project "New innovation models in Switzerland". Sector brief: Finance.* Link

Funded and made possible by

interpharma:ph

Schweizerische Eidgenossenschaft
Confédération suisse
Confederazione Svizzera
Confederaziun svizra

Swiss Confederation

Federal Department of Economic Affairs,
Education and Research EAER
State Secretariat for Education,
Research and Innovation SERI

Executive summary

This report analyses the innovation landscape of the Swiss pharmaceutical, chemical, and biotechnology industries, based on an industry-specific survey and two rounds of Delphi interviews with industry experts. The results show that, while these industries remain among the most innovative and research-intensive in Switzerland, they are facing increasing pressure from rising development costs, complex regulatory frameworks, and digitalisation challenges. It is important to note that the presented statistical results only refer to the companies that responded and they are not representative of the industries as a whole.

The survey results show that radical and incremental innovations are widespread in all three sub-sectors. Biotechnology companies are most frequently developing radical innovations. Collaboration remains a central element of the innovation models, particularly in the pharmaceutical and biotechnology industries, where companies often collaborate with academic institutions and other industry players. In contrast, the chemical companies surveyed report lower collaboration rates and a more limited diversity of partners. Regulation plays a significant role in shaping innovation activities, in particular data protection[1] and process-related regulations. The surveyed companies report higher innovation costs due to regulatory requirements. Digitalisation has become an important driver of innovation, although its acceptance varies across sub-sectors. Big data and AI are strongly emphasised in the pharmaceutical and biotechnology industries, whereas chemical companies use data-driven tools somewhat less frequently. Sustainability is an increasingly important driver of innovation, particularly in the chemical sector, which has the highest proportion of environmentally friendly innovations.

The Delphi interviews revealed a broad consensus among experts on five key policy priorities. Firstly, innovation funding must be strengthened across the entire R&D value chain. This should include more flexible funding instruments, improved support for early-stage companies, and clearer national innovation priorities. Secondly, collaborative ecosystems should be strengthened by encouraging more business-led collaborative projects and improving transparency and responsiveness at Innosuisse. Thirdly, access to data and digital infrastructure must be expanded whereby experts pushing for standardised, high-quality electronic patient data and a secure national e-ID. Fourthly, regulatory processes must become faster and more predictable. Finally, talent development remains crucial, with industry experts calling for an easier recruitment of global talent and stronger basic training in higher education.

Taken together, these findings point to a highly innovative sector whose activities are taking place in an increasingly complex environment. Improving conditions relating to financing, collaboration, data availability, innovation-friendly regulation and skills development could help Switzerland maintain its competitive position as a leading location for innovation in the fields of chemistry, pharmaceuticals and biotechnology.

[1] In particular, the availability of anonymized high-quality data would be an opportunity for innovation activities.

1 Introduction

This industry report analyses innovation models in the Swiss pharmaceutical, chemical, and biotechnology industries. It is part of a broader research project investigating new “innovation models” in the Swiss economy.[2] This report aims to provide an evidence-based understanding of how companies in these industries innovate, the factors that influence their innovation activities, and the framework conditions that could enhance the long-term competitiveness of these industries in Switzerland as locations for research and development.

Drawing on various sources, including an industry-specific survey of Swiss companies and two rounds of Delphi interviews with sector experts, the report synthesises quantitative and qualitative data on the factors shaping innovation dynamics within these sectors. The survey results provide an overview of innovation practices, cooperation patterns, regulatory influences, digitisation activities, and sustainability-related innovation activities among the surveyed companies.

In addition to these results, the Delphi interviews offer insight into the industries' policy priorities. Experts from the pharmaceutical, chemical, and biotechnology sectors participated in bilateral interviews and a consensus-oriented workshop. This enabled a structured discussion of the most pressing challenges and areas for action in innovation policy. Five areas for action were identified that could significantly strengthen the innovative capacity of these industries. These are: a) improving innovation financing along the R&D value chain; b) strengthening cooperation and partnership ecosystems; c) improving access to high-quality data and digital infrastructure; d) making regulation more innovation-friendly; and e) strengthening talent development and education.

Combining survey results, expert assessments, and findings from the literature, this report provides an overview of the innovation landscape in the pharmaceutical, chemical, and biotechnology industries. It also identifies areas in which policymakers can contribute to strengthening innovation performance in these sectors.

2 Literature review

The pharmaceuticals, chemicals, and biotech sector is a very innovative sector and one of the most R&D intensive in the world and in Switzerland. While the sector remains highly innovative, it has been facing a clear productivity challenge. Drug development costs and timelines have both increased exponentially. The number of attempts per successfully developed drug (pipeline size) has increased (Schuhmacher et al., 2016), the return on investment has decreased (Destro & Barolo, 2022) and more generally; the drug innovation output is stagnating, even though investment is increasing (Munos, 2009). Decreasing the innovation cycle timeline is one of the key challenges faced by the industry (Schneider et al., 2020).

Against this background this sectoral report aims at presenting the key characteristics of innovation models of the pharmaceutical, chemicals, and biotech sector in Switzerland. A number of studies, both academic and policy oriented, have already examined the questions

[2] Barjak, F., Heimsch, F., Cornet, B., Foray, D., Wörter, M. & Schenckery, A. (2026). *New innovation models in Switzerland. Report on behalf of the Swiss State Secretariat for Education, Research and Innovation (SERI).*

that we are addressing in this report. We introduce here some of the key contextual elements on the five domains that we have addressed through the survey and the Delphi interviews conducted for this project.

2.1 Innovation activities in the Pharmaceutical, biotech, and chemicals sector

The pharmaceutical, biotech, and chemicals sector is traditionally very R&D focused. Swiss biotech companies invest around CHF 2.5 billion per year in R&D projects (Swiss Biotech Report 2025 - The Power of International Alliances, 2025) and pharmaceutical companies invested over CHF 9 billion in R&D in 2022 (The Importance of the Pharmaceutical Industry for Switzerland, 2024).

Radical innovations include creating new molecules or developing new chemicals. Incremental innovations, when they develop new manufacturing methods, consist of the production of generics, or focus on new clinical or industrial uses of existing molecules. While the more radical innovations are more salient, incremental innovations are also patented. Firms with patented process innovations have significantly higher sales than those that do not (Lugovoi et al., 2022).

2.2 Regulation

Regulation can address some of the market failures and align companies' interests with social welfare, by making radical innovation more attractive through intellectual property protection, and by providing regulation that strives to guarantee the safety of new drugs, chemicals, and biotechnologies before they are put on the market.

For innovative treatments, regulation on the reimbursement is also crucial to ensure patients have access to the drug and firms can sell their innovation. In Switzerland, the reimbursement step has been recognized as one of the barriers, with fewer innovative medicines reimbursed as standard compared to neighboring countries such as Germany (Schoy, 2025).

Intellectual property regulation is also highly influential in the sector. Investment in R&D is very costly, but once a new molecule has been discovered, there are few barriers to reproducing it. The intellectual property framework must be carefully calibrated to ensure a balance between incentivizing R&D through a temporary monopoly for the firm having developed the new product and improving access to innovative treatments available at a lower price thanks to competition (Garthwaite, 2025).

2.3 Collaboration

Innovation in the pharmaceutical, biotech, and chemical sector has traditionally been very collaborative. In particular, international collaborations play a strong role in the pharmaceutical and biotechnology sector in Switzerland. Firms traditionally develop innovative solutions with international partners (Swiss Biotech Report 2025 - The Power of International Alliances, 2025)

Collaboration between academic partners and industry actors in the sector is frequent, especially in the pharmaceuticals and biotechnology sectors, but can face challenges. Notably, communication can be a challenge as the modes of communication and timelines vary

significantly between partners (Gersdorf et al., 2019) even though this doesn't always imply failure of the collaboration (He et al., 2021).

In the face of increasing drug development costs for traditional knowledge production processes, innovation in the sector has started to leverage an increasing amount of external knowledge. The traditional innovation model, focusing on licensing deals and mergers and acquisitions, has proven to struggle to be productive enough (Munos, 2009). Firms have increasingly relied on leveraging external innovation in different ways, whether by using internal resources to develop externally generated innovation, using external R&D resources to develop internally generated innovation, or using external R&D to manage external innovation (Schuhmacher et al., 2013, 2016).

2.4 Digitalization

Innovation in the pharmaceutical, biotech, and chemicals sector has been increasingly impacted by digitalization. Data has become a key input for innovation. Digitalization of research in the pharmaceuticals sector has made good quality data a key new raw material for R&D (Jiménez-Luna et al., 2021).

Concretely, digitalization offers opportunities for drug development process innovations. Real-world data can be the basis for the development of new drugs or pre-existing drugs for new clinical indications (Bentele & Weder, 2024; Hird et al., 2016). New digital technologies, notably based on AI, can be employed for more efficient drug or chemical discovery. Machine learning based techniques can identify patient subgroups allowing for more targeted clinical trials or can help identify which research avenues are most likely to be successful.

Despite progress, challenges persist in data and digitalization for drug development, chemicals, and biotechnology. Quantity of data has exploded, but data quality may still be lacking. Accessing high-quality data and avoiding estimation of too many key variables when doing research is still a challenge for innovators (Bender & Cortés-Ciriano, 2021).

In Switzerland, the legal framework in which data is collected and used is not always clear. As explained by Bentele and Weder 2024, Switzerland has little harmonized, digital, and interoperable data collection. Re-using data (secondary data, when it was not collected for this purpose) is also difficult and requires many regulatory steps. While the internationalization of data and research has provided new opportunities for innovation (Achilladelis & Antonakis, 2001), local data remains very important (Ormond et al., 2024).

2.5 Sustainability

The pharmaceutical, biotech, and chemical industry has integrated environmental, social, and governance considerations. In particular, large firms participate in ESG reporting. However, the high and increasing prices of novel drugs have raised questions about the financial sustainability of health systems (OECD, 2018).

Environmental sustainability is a key challenge for the chemicals sector (Global Chemicals Outlook, 2019). Industry actors and other international institutions have stated that minimizing adverse impacts of chemicals and waste is a clear challenge for the future of the industry.

3 Sector-specific survey results

3.1 Data basis and method

This policy brief focuses on the survey results for the chemicals, pharmaceuticals, and biotechnology sector, one of the six industries analysed in the context of this Innovation models project.

A sample of VAT numbers ("UIDs") from the chemicals, pharmaceutical, and biotechnology sector were obtained for the survey. A large majority were provided as a stratified random sample from the corresponding NOGA classes by the Swiss Federal Office of Statistics. Additional UIDs were contributed by the supporting industry associations. The chemicals, pharmaceuticals, and biotechnology sector is defined by NOGA classes 19-21 and 7211. In total, the stratified random sample contained 760 companies.

The invitation was sent in December 2025. Questions asked about the most recent time frame 2021-23, following the Swiss Innovation Survey and European Community Innovation Survey practice of collecting innovation data for a three-year time-period. In order to detect changes over time, questions were also asked about the previous period in 2020 and earlier. No precise time frame was specified, as it was assumed that events that occurred longer ago would be subject to memory errors and that any precision would only be apparent. Following low initial response, follow-up efforts included a printed survey invitation mailing and telephone calls to non-responding companies.

The overall response rate was 30.3%, with 1,744 companies activating the link to the questionnaire or requesting a printable version of the questionnaire. The chemicals, pharmaceuticals, and biotechnology sector had a 24.4% response rate (with 3.5% rejecting the invitation), which was slightly below the total average of 26.5%.

It was important to note that the statistical data in this report only refers to the companies that responded. The results are not representative for the sectors or Switzerland as a whole as innovative companies are overrepresented. In order to classify the results, it is important to consider the distribution of responses by sector and size. 25.7% of firms in the chemicals, pharmaceuticals, and biotechnology sector have between 1 and 9 employees, 31.5% have between 10 and 49 employees, 19.6% have between 50 and 249 employees, and 18.5% have over 250 employees.

3.2 Results

3.2.1 Innovation activities in the sector

The chemicals, pharmaceuticals and biotechnology sector is very innovative, with 50% of firms reporting that they innovate radically (new to the market innovation) and 67% reporting that they innovate incrementally (new to the firm innovation)[3].

[3] See Appendix table 1 for the totals for the sector

We see some notable differences within the sub-sectors, however. In the chemicals and pharmaceutical sector, incremental innovation dominates with over 70% of firms reporting that they engage in this, while only around 50% report innovating radically. In the biotechnology sector, firms engage more frequently in radical innovation (76%) than in incremental innovation (44%). This is also consistent with the age of the sectors, younger sectors tend to be more (radically) innovative than more established sectors; the biotechnology sector is not as established as the chemicals and pharmaceuticals sector.

Figure 1. Proportion (%) of radical and incremental innovation

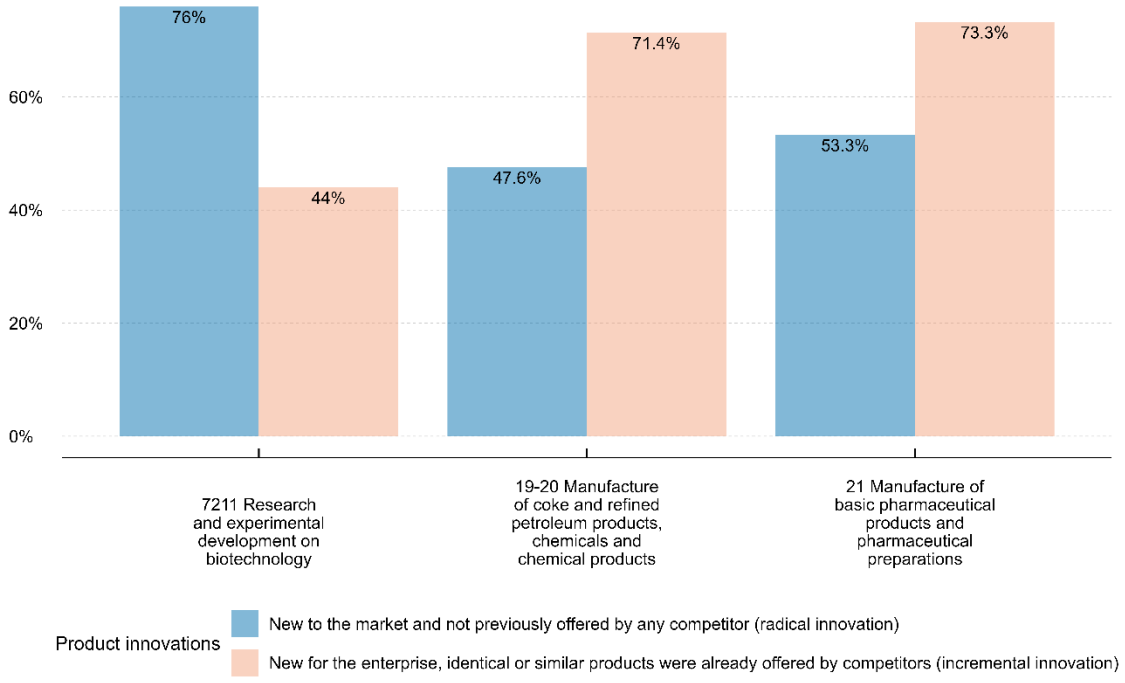
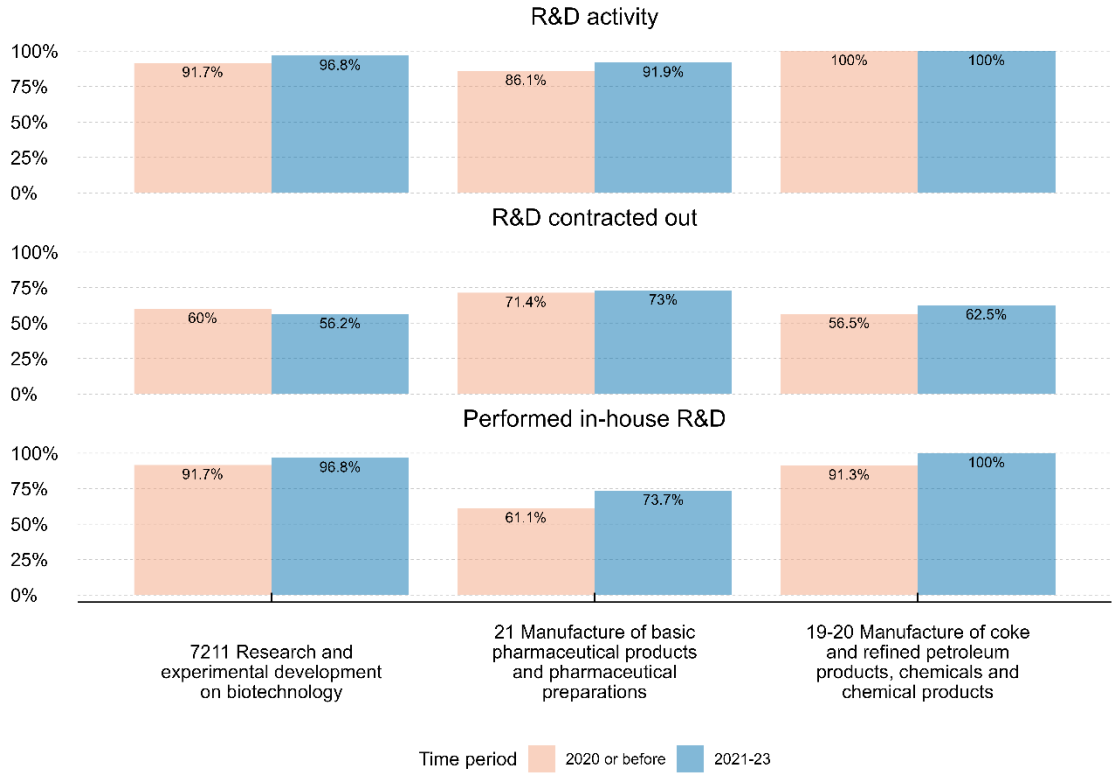


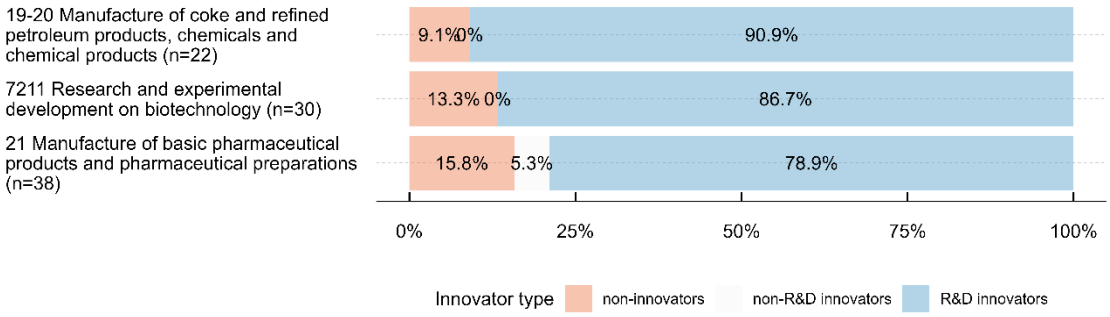
Figure 2: R&D activities by sector (in %)



The chemicals, pharmaceuticals, and biotechnology sector is a very R&D-intensive sector. The pharmaceuticals sector is however more likely to contract R&D out than the other sub-sectors. Almost 90% of all firms of the Chemicals, pharmaceuticals, and biotechnology sector report engaging in R&D activity in 2021-2023 (see Appendix table 3). In the pharmaceutical industry, R&D is more frequently contracted out, over 70% of firms out-source R&D. In the biotechnology and chemicals sectors, contracted out R&D is slightly rarer (around 60%) while over 95% of firms report in-house R&D in 2021-2023. While many pharmaceutical firms report in-house R&D, this proportion is lower than in the other two sectors as only around 70% of the firms do so.

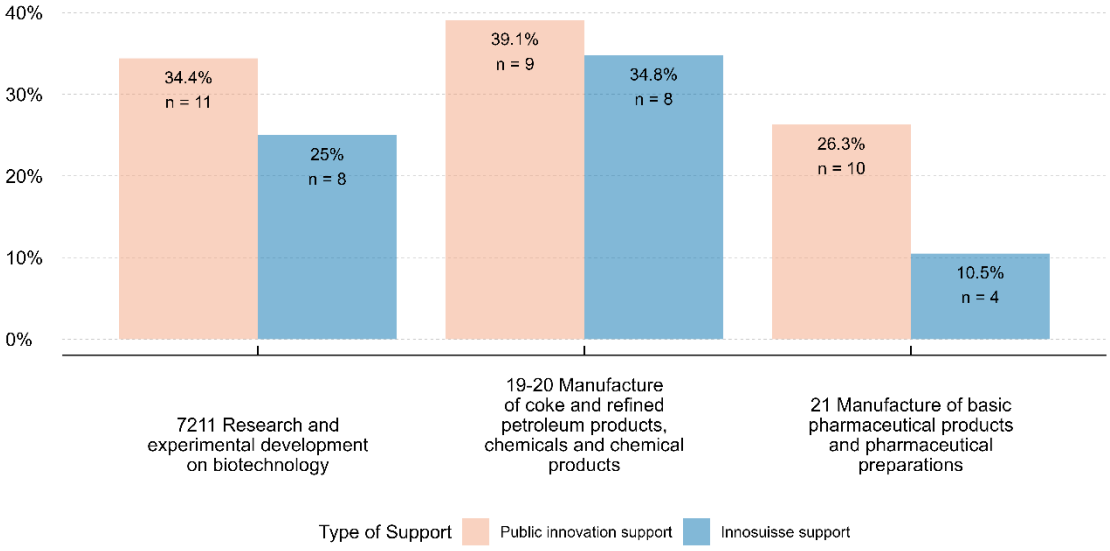
Firms in each sub-sector are highly innovative (at least 85%), and a very large majority of innovation takes place through R&D. We do see the presence of a few non-R&D innovators in the pharmaceutical sector (5%). These could be firms that are focused on the manufacturing of pharmaceutical products, engaging in process or organizational innovations that don't require R&D.

Figure 3: Innovator types by sector (in %)



Firms in these sectors benefit from some public innovation support. Around 16% of firms receive Innosuisse support and around 28% of firms receive other public innovation support such as cantonal programs, other Swiss funding organizations, cantonal or regional agencies, other international funding, or EU programs. The pharmaceuticals sector tends to receive slightly less Innosuisse support (11%) as the others (25% and 35% respectively).

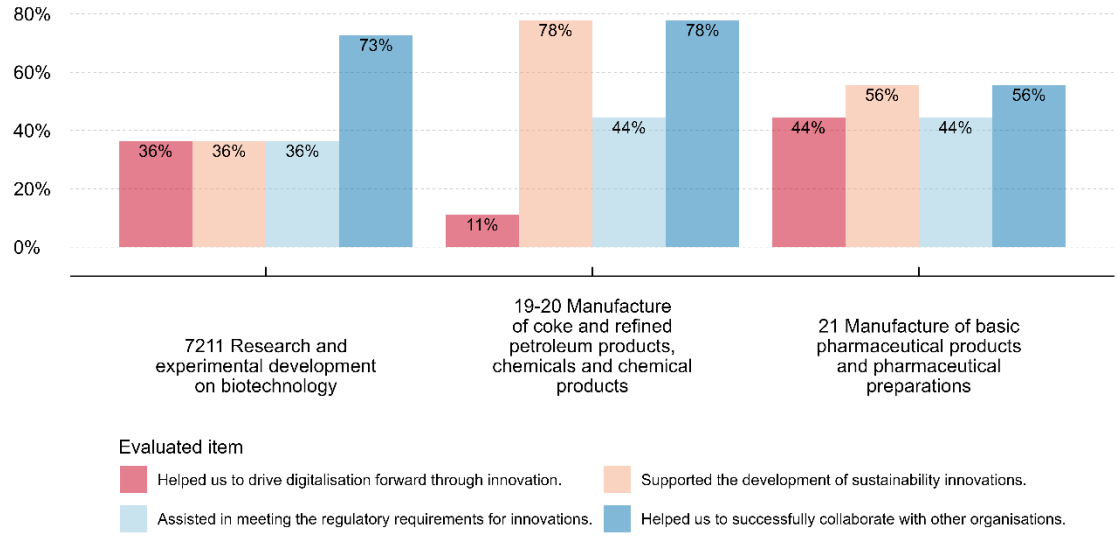
Figure 4: Use of public innovation support and Innosuisse support by sector (in %)



Note: See Appendix table 2 on sector totals.

In the biotechnology sector, public innovation support was thought to be very beneficial for successful collaboration with other innovations, as 73% of firms report this. In the chemicals sector, only one firm reports that innovation support helped drive digitalization forward. This is in line with the low digitalization of the sector reported in related questions. A large proportion consider that innovation support helped collaboration with other organizations and with sustainability innovations. This corroborates the importance of sustainability in the innovation of the chemicals sector. In the pharmaceutical sector, all four categories are rated at the same level.

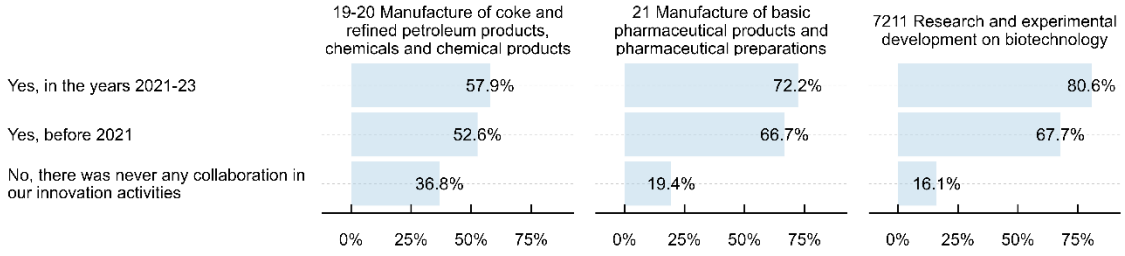
Figure 5: Evaluation of public innovation support by sector (% of firms agreeing to an effect)



3.2.2 Collaboration

In all three sub-sectors, collaboration increased between before 2021 and 2021-2023. However, the proportion of firms collaborating with any sort of actor (academia, other firm, regulatory bodies…) is significantly lower in the chemical sector. 36% of the chemical firms responding to the survey say there was no collaboration in their innovation activities in either time period. By contrast, only 19% of pharmaceutical firms and 16% of biotechnology firms say the same. This hints at significantly different innovation strategies.

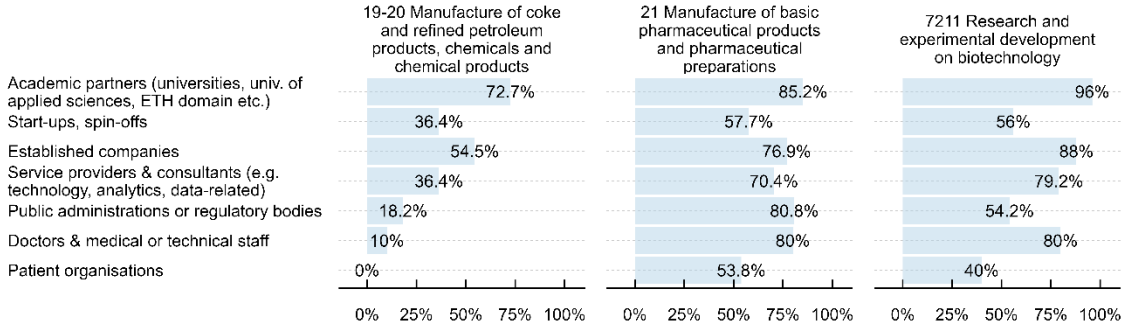
Figure 6: Participation in innovation collaboration



All three sub-sectors have a large majority of responding firms working with academic partners (between 72 and 96%). This is coherent with the fact that innovation funding is often given to projects in collaboration with academic actors.

The chemical industry generally reports less of a variety of important collaboration partners, which could be a result of less collaboration in the innovation practices of the sector. Even within firms that collaborate for innovation, the number of partners could be lower. In the pharmaceutical and biotechnology sectors, all the categories of partners are reported by at least 50% of responding firms (except patient organizations for the biotechnology sector).

Figure 7: Important collaboration partners by sector (in %)



3.2.3 Regulation:

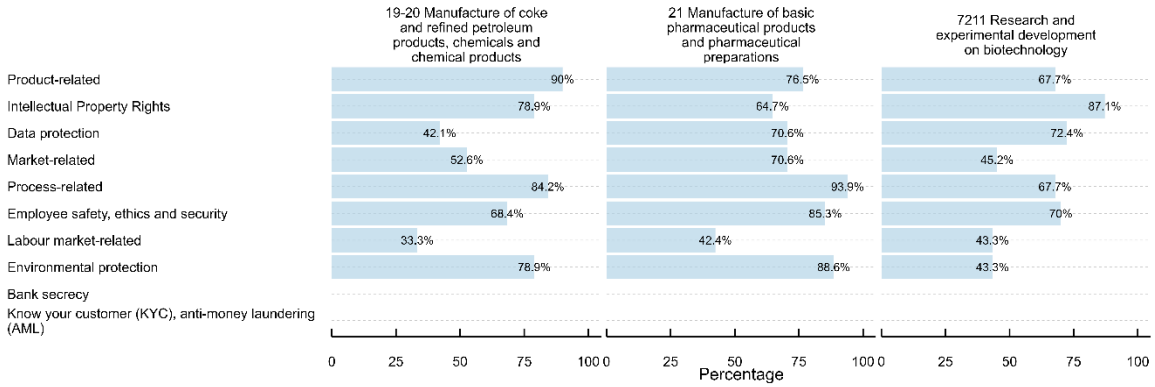
Regulation is often cited as a highly influential factor to innovation. The pharmaceutical, chemicals, and biotechnology sector is not an exception. In all three subsectors, product-related regulation is particularly relevant.

In the chemicals sector, intellectual property regulation, process related regulation, and environmental protection regulation is cited as the most important. Due to the nature of chemical work, the importance of environmental protection regulation is expected.

In the pharmaceutical sector, process-related regulation, data protection regulation, and environmental regulation is particularly important. The importance given to data protection regulation corroborates survey results on the importance of big data and other digitalization tools in the sector, which we also find in previous literature and policy and industry reports.

In the biotechnology sector, intellectual property is the most frequently cited regulation with over 87% of firms reporting that it is important to their innovation activities. This is coherent with the particular importance of radical innovation in the sector. New to the market products are more frequent in this sector and are more likely to be protected through intellectual property.

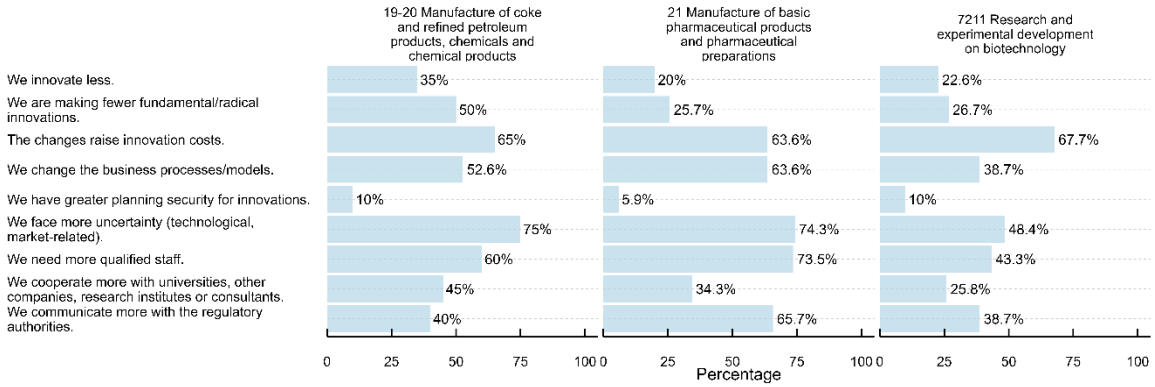
Figure 8: Importance of regulation for innovation by company size (in %)[4]



Beyond the importance of certain types of regulation, the survey also provides information on the effect of regulation. We find that all three subsectors experience higher innovation costs due to regulation, but few firms in each sector find that regulation means they innovate less (fewer than one third of firms). The pharmaceutical sector reports that regulation means firms communicate more with the regulatory agencies. This is aligned with the importance of regulatory agencies for market access for new pharmaceutical products. We do not find the same phenomenon for the biotechnology sector, suggesting that they do not have the same necessity of communication with regulatory authorities. The pharmaceutical and chemicals sectors report increased technological and market-related uncertainty due to regulation, which is not reported by firms of the biotech sector.

These findings let us imagine that while regulation does not directly reduce the amount of innovation happening, the amount of R&D being carried out could be suboptimal because of the extra costs brought on by regulation that firms must bear.

Figure 9: Impact of regulatory changes on innovation activities in the years 2021-2023 by subsector (in %)

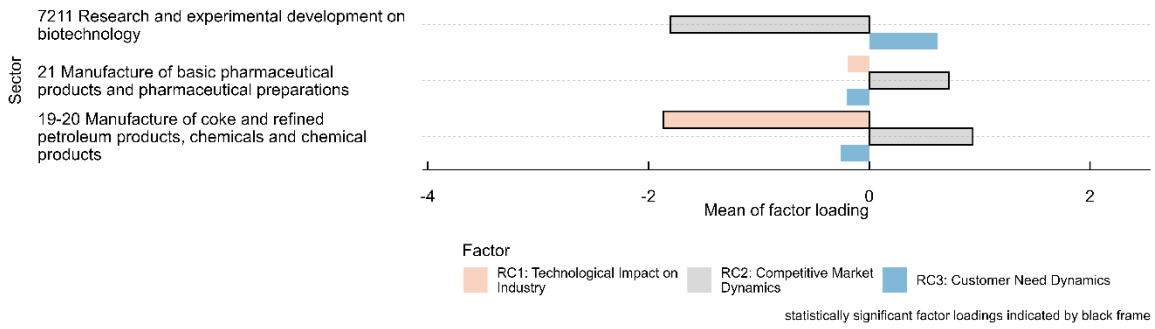


[4] The activities of the sectors we are currently examining do not Know your customer, anti-money laundering regulation or Bank secrecy regulation relevant. No firm of any of the three subsectors cites them as important regulation.

3.2.4 Digitalization:

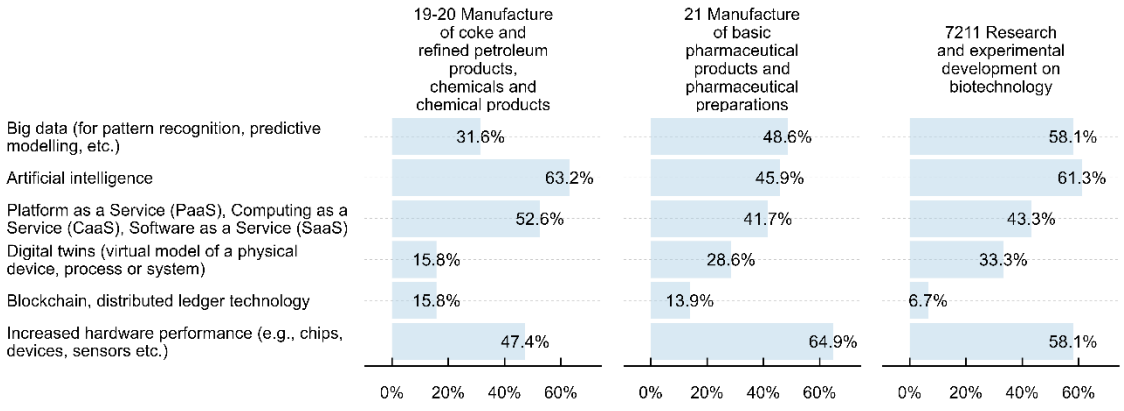
The impact of digitalization on innovation presents some heterogeneity within the subsectors. We examine the importance of the different factors of innovation per sector. In the biotechnology and pharmaceutical sectors, innovation is strongly driven by competitive market dynamics, while customer needs and technological impact on the industry do not have a statistically significant effect on innovation. In the chemicals sector, market dynamics are also a statistically significant factor, but technological impact on industry is also a factor driving innovation.

Figure 10: Mean-factor loadings of customer, technology and market factors by sectors



Our survey also allows us to go into detail on which types of digital technology firms of each subsector consider relevant. In the pharmaceutical sector, hardware performance is the most cited relevant technology, followed by big data, AI, and cloud services. In the biotechnology sector, hardware performance, big data, and AI are cited by more than half of the firms. In the chemicals sector, artificial intelligence (AI), cloud services, and hardware performance are considered particularly relevant. Big data is cited less often as important than in the other sectors. This shows us that while digitalization is prominent in each of the sub sectors, we can see some heterogeneity, in particular with regards to the use of big data.

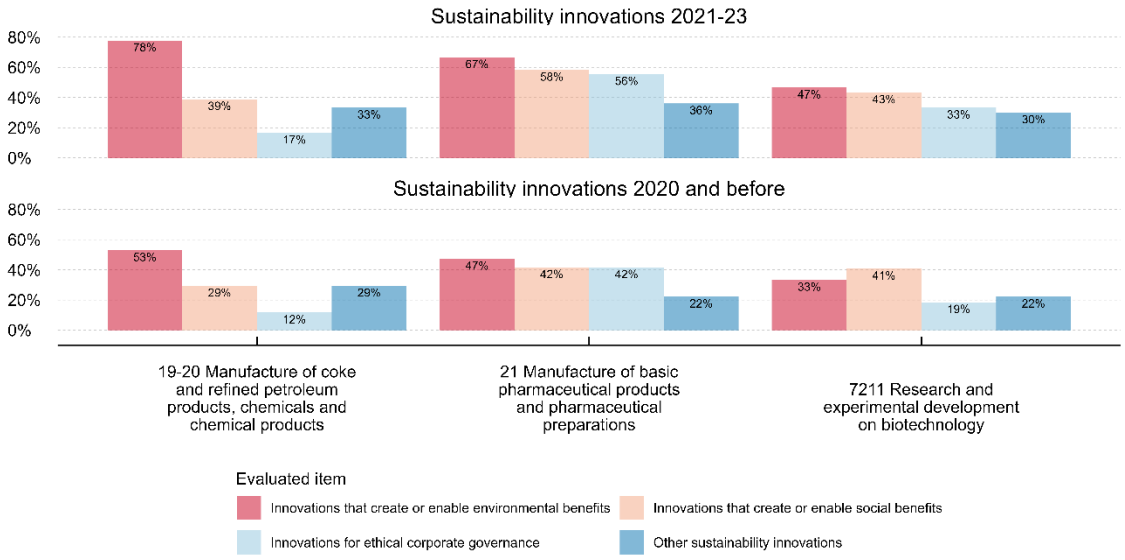
Figure 11: Share of companies perceiving advances in digital technologies as important by sector



3.2.5 Sustainability

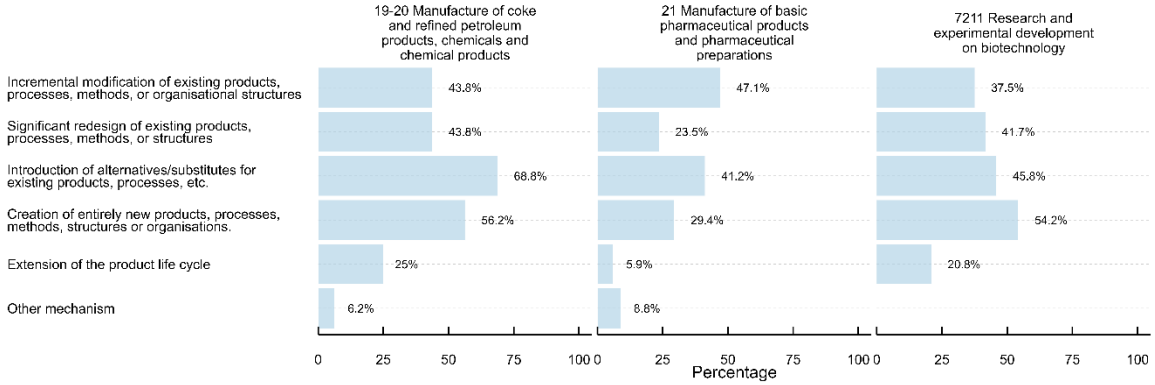
Within the survey, part of the chemical, pharmaceutical, and biotechnology firms reported innovating to increase sustainability. In all three subsectors, the proportion of firms reporting innovation for sustainability increased between before 2020 and 2021-2023. This was the case for all aspects of the ESG criteria (environmental benefits, social benefits, corporate governance, other sustainability innovations). Innovation for environmental benefits is generally the most widespread type of ESG innovation, though the proportion of firms engaging in it varies depending on the subsector. Environmental innovations dominate very clearly in the chemical sector where 78% of firms report innovation in that domain between 2021 and 2023, while only 67% and 47% of pharmaceutical and biotechnology firms report the same during that time period.

Figure 12: Sustainability innovations by sector in 2021/23 and 2020 and before (in %)



While all sectors report some innovation helping with sustainability, the mechanisms through which the innovations contribute to sustainability vary between sectors. In the chemical sector, the most common mechanism is the introduction of alternatives for existing products and processes. In the pharmaceutical industry, the most frequently reported mechanism is incremental modification of production and processing, followed closely by the introduction of alternatives and substitutes for existing products and processes. Significant redesign of existing products or processes is less cited. Innovation in the biotechnology sector contributes to sustainability most frequently by creating entirely new products or processes. Thus, our survey shows that the biotechnology sector innovates for sustainability through more radical innovations, while the pharmaceutical sector innovates for sustainability through incremental innovation, and the chemistry sector falls somewhere in the middle.

Figure 13: Mechanisms of sustainability innovations with benefits for the environment, society, or governance by sector (in %)



3.3 Summary

The survey finds many elements of the innovation models of Swiss pharmaceuticals, chemicals, and biotechnology companies confirm previous studies and literature. All three subsectors report being highly innovative and very R&D intensive. Almost all respondents are R&D innovators. The biotechnology sector engages particularly frequently in radical innovation compared to the pharmaceuticals and chemicals sectors. The survey also allows us to see different collaboration models between the chemicals sector, where more companies never collaborate, and the other sectors, where collaboration is more widespread. Responding firms report using new digital tools, though notably the chemistry sector considers big data and the tools to exploit it less relevant than the other sectors. Regulation influences innovation activities in each sector.. The three subsectors experience higher innovation costs due to regulation, but few firms in each sector find that regulation means they innovate less (fewer than one third of firms). Finally, sustainability is a driver of some innovation. In particular, environmental concerns drive innovation in the chemicals sector.

4 Sector-specific results of the Delphi interviews

The following section summarises the results of Delphi rounds 1 and 2, in which experts from the pharmaceutical, chemical and biotechnology industries participated in order to identify and discuss policy measures to strengthen Switzerland's innovation system. Building on the findings from the first round of bilateral interviews and supplemented by a consensus-oriented workshop in the second round, the results presented here reflect the shared priorities of the participating experts, representing companies of different size classes and technological orientations.

4.1 Data basis

The Delphi study was based on two rounds of interviews with experts from the pharmaceutical, chemical and biotechnological sectors. In the first round we conducted 13 bilateral online interviews with experts from those industries. The interviews were semi-structured based on 14 guiding questions[5]. Each interview lasted between 20 and 30 minutes. The experts represented 5 small companies (1-49 employees), 2 medium-sized companies (50-249 employees) and 6 large companies (250+).

In the second Delphi round we gather the experts from the first round for an in-person meeting with the goal to reach a consent on urgent innovation policy issues in these sectors. This second meeting lasted for 2 hours and was moderated by one of the authors of this study.

The statements presented in this section are based on the contributions made during these interviews. They reflect the individual perceptions and experiences of the participants. The statements were not subjected to any further in-depth review or validation as part of this study.

4.2 Results of Delphi rounds 1 and 2

In what follows we present a summary of the insights gather during the first and second round of Delphi interviews. It represents the viewpoints of the invited experts on existing policy instruments and their recommendations for improving the innovation environment.

4.2.1. Summary of Delphi round 1

General comments: Some experts observe no general decline in research and development/innovation, but emphasise that innovation is increasingly influenced by global conditions and location competition.The high cost level and the fact that prices in Switzerland are not competitive internationally are mentioned as constraints, especially in comparison to neighbouring markets. Logistics are relatively expensive for a small market. Several respondents highlight ongoing financing difficulties in the early and scaling phases of innovation projects (e.g. financing prior to clinical testing and implementation). This can lead to start-ups or development activities being relocated abroad. Some also emphasise that funding policy should primarily aim to remove barriers and create favourable conditions rather than directly attempting to “pick winners”.

Digitalisation: Digitalisation is seen as an important driver of innovation, enabling more efficient research and development and new approaches – especially where high-quality data

[5] a) Are you observing a trend towards declining R&D in your industry or field of activity? b) In your opinion, are new policy measures needed to encourage companies to engage in or remain in R&D activities in Switzerland? c) What types of instruments or reforms do you consider particularly effective for your company? d) In your opinion, is one of these factors (digitalization, sustainability, regulation, collaboration) also decisive for innovation in your company? e) To what extent does digitalisation currently represent an opportunity for innovation in your company? f) How could Swiss policy support digitalisation? g) In your opinion, which regulations (types of regulations) are primarily a direct obstacle to innovation? h) Why regulations are an obstacle? What could be improved so that regulation supports innovation? i) Which regulations drive already innovation (e.g. innovation driven by compliance with regulations, setting of standards)? j) Do you consider sustainability to be a driver of innovation or more an obstacle in your company? k) What policy measures could strengthen sustainable innovation in your company/sector? l) How do you see this for your company: Do the costs/benefits of collaborating with academic organisations differ from the costs/benefits of collaborating with other companies? m) Should innovation policy support innovation cooperation between companies? n) What could innovation policy do to promote both types of innovation cooperation?

is available. At the same time, several experts point out that Switzerland lacks important prerequisites such as standardised, interoperable health data and comprehensive open data mechanisms, which limits the potential of AI/data-driven research. The lack of widespread electronic identification is also described as an obstacle to digital processes and broader development of the ecosystem. However, there are also warnings that digitalisation can become a burden if compliance requirements increase administrative costs without improving innovation outcomes.

Sustainability: Opinions differ on the importance of sustainability for innovation activities: some experts describe sustainability as neutral for innovation (i.e. not a direct obstacle), while others consider it increasingly relevant due to ESG expectations and operational requirements. Experts from large companies state that they take sustainability seriously as part of their long-term strategy and reporting obligations. A recurring point is that sustainability-related measures can create additional work, but their relevance for innovation varies depending on the type of company and business model.

Regulation: Although regulation is generally recognised as necessary to ensure safety, quality and trust, experts emphasise that its current design and implementation often hinders rather than promotes innovation. A key concern relates to the complexity, duration and fragmentation of regulatory processes. Approval procedures – particularly for clinical trials – are often described as slow and unpredictable. Approvals by ethics committees can significantly delay projects, and cantonal fragmentation leads to inconsistent interpretations and procedures. Participation in the EU's research framework programmes is considered essential for maintaining Switzerland's attractiveness as a research location. Regulations are often seen as too detailed, rigid and not pragmatic enough, leaving little room for experimentation. Experts are calling for “smart regulation” that sets clear standards while allowing for protected spaces or “islands” for innovation. Market access and reimbursement rules are another critical bottleneck. Prospective payment systems only reimburse treatments with proven effectiveness, leading to a “chicken-and-egg” problem: innovations cannot be tested or introduced because they are not reimbursed, and they cannot be reimbursed because they are not yet widely used. Strict data protection regulations, a lack of harmonisation and the very limited use of electronic patient records reduce the availability of usable data for research and scaling. Experts warn that Swiss and European regulations (e.g. EU AI Act) could be slower and less adaptable than regulatory approaches in other regions (e.g. China). Regulation is also considered to be particularly burdensome for SMEs. High compliance costs and complex product approval and bureaucratic requirements tie up resources without contributing to innovation.

Collaboration: Experts largely agree that collaboration is essential for innovation but point to practical and institutional barriers that limit its effectiveness in Switzerland. Collaboration with academic institutions is generally valued, particularly for access to scientific expertise, talent and early-stage innovation projects. However, respondents often criticise the complexity, slowness and lack of standardisation of intellectual property (IP) agreements with Swiss universities and technology transfer offices. Experts also report limited transparency in ongoing university projects and call for better matchmaking mechanisms. Small, informal networks of SMEs – often regionally based and operating outside formal associations – are highlighted as effective for implementing joint projects. These informal collaborations are based largely on trust and require strong data and knowledge protection. Public funding instruments such as Innosuisse are generally viewed positively, as they promote cooperation between science

and industry. Experts report that the results of such collaborations depend heavily on the respective academic partner. Meaningful promotion of cooperation is difficult without parallel regulatory reforms. For instance, regulatory barriers can prevent product development and market entry. Some experts emphasise that cooperation is often hampered by difficulties related to IP regulations. International collaboration is essential to secure skilled labour and maintain competitiveness. Some experts also argue that start-ups need stronger, long-term support structures - combining collaboration, financing, and regulatory clarity - to remain anchored and grow in Switzerland.

Criticism of the current innovation policy framework: Experts largely agree that Switzerland has strong research institutions and well-established instruments for promoting innovation. However, some also argue that the current policy framework is increasingly failing to meet the needs of businesses, especially SMEs and start-ups. A recurring criticism is the strong academisation of innovation policy. This gives the impression that funding programmes give priority to academic excellence, which means that companies have only limited influence on the direction of projects and there are only limited incentives for them to participate. Another problem is the persistent lack of early-stage financing. Although Switzerland is successful in creating spin-offs, many start-ups relocate abroad to secure start-up capital and capital for the early growth phase. Experts also criticise the weak links in the innovation chain between scientific research and industrial application, and between industrial R&D and market launch. Universities are also criticised for drifting away from fundamental scientific training. Experts also report unclear decision-making processes, and limited insight into ongoing university research.

4.2.2. Summary of Delphi round 2

A summary of the first-round results for the sector was shared with the participants with an invitation to the second-round (group) discussion. When asked which results should be prioritised, the experts agreed on five key themes: strengthening innovation financing along the entire R&D value chain; strengthening collaboration and partnership ecosystems; increasing data openness and improving digital infrastructure; improving the innovation-friendliness of regulatory processes; and strengthening talent development and training. The areas summarised below reflect these shared priorities and outline measures that policymakers could take to create a better, more future-oriented environment for pharmaceutical innovation in Switzerland.

1. Strengthen innovation financing

- Adopt a value chain perspective with regard to R&D investment. Streamline R&D funding and make the policy flexible enough to adapt to all of the stages of R&D, rather than focusing on individual stages and risking overlooking a key step or overcomplicating the procedures.

- Offer tax relief for failed early-stage investments or ventures, following the example of the United Kingdom (Tax relief for investors using venture capital schemes - GOV.UK).

- Provide more funding at the implementation stage. Portugal can be an example – they offer 40% CAPEX grants for the implementation of a material startup, making them significantly more attractive than Switzerland for such projects.

- Use the Swiss National Bank's foreign currency reserves to invest in innovation activities, rather than investing them in international capital markets.

- Identify and set policy priorities for innovation based on national strengths, which are used to focus innovation funding. This change in the logic of innovation funding allows for more targeted and efficient use of funds, providing not only funding, but also attract relevant skilled labor and collaboration partners to a particular area of innovation (technology). Government investments following these priorities could act as a signal to attract more private investments.

2. **Strengthen collaboration and partnership ecosystems.**
    - Increase business-led initiatives and projects at Innosuisse. Ensure that industry actors also have a leading role and that their way of thinking is also taken into account in the collaborative process.

    - Make the Innosuisse decision-process more transparent, through better and more thorough feedback, simplifying the application process, and offering a cycle system where a dialogue between the industry partner, the academic partner, and Innosuisse is established leading up to a final funding decision.

3. **Increase data openness and sharing.**

    - Provide access to high-quality, anonymized, digitalized, and standardized electronic patient files to industry and academic actors conducting research.

        - The small size of Switzerland can limit how useful such electronic patient files are, but few, if any, countries currently have exhaustive, electronic, standardized, and accessible patient data.

    - Develop a secure personal e-ID available to all.

    - Support a digital ecosystem where local and international firms work together to create value in Switzerland. For example, supporting the ecosystem around large tech firms such as Google in Zurich could lead to valuable spillovers in the form of innovative new products.

4. **Make regulation more innovation friendly**

    - Speed up and make more predictable the drug reimbursement process in Switzerland.

5. **Strengthen talent development, skills, and education**

- Make it easier and faster to recruit foreign non-EU employees by simplifying the immigration process when the companies have chosen someone. This would allow firms to recruit the most competent people worldwide.

- Focus higher education programs on developing fundamental knowledge in the field instead of more sophisticated, but often less relevant and more niche skills.

References

Achilladelis, B., & Antonakis, N. (2001). The dynamics of technological innovation: The case of the pharmaceutical industry. *Research Policy*, *30*(4), 535–588. https://doi.org/10.1016/S0048-7333(00)00093-7

Bender, A., & Cortés-Ciriano, I. (2021). Artificial intelligence in drug discovery: What is realistic, what are illusions? Part 1: Ways to make an impact, and why we are not there yet. *Drug Discovery Today*, *26*(2), 511–524. https://doi.org/10.1016/j.drudis.2020.12.009

Bentele, R., & Weder, R. (2024). *On the Importance of Swiss Patient Data for Pharmaceutical R&D in Switzerland*. https://hdl.handle.net/20.500.14716/129518

Destro, F., & Barolo, M. (2022). A review on the modernization of pharmaceutical development and manufacturing – Trends, perspectives, and the role of mathematical modeling. *International Journal of Pharmaceutics*, *620*, 121715. https://doi.org/10.1016/j.ijpharm.2022.121715

Garthwaite, C. (2025). Economic Markets and Pharmaceutical Innovation. *Journal of Economic Perspectives*, *39*(2), 3–26. https://doi.org/10.1257/jep.20251438

Gersdorf, T., He, V. F., Schlesinger, A., Koch, G., Ehrismann, D., Widmer, H., & von Krogh, G. (2019). Demystifying industry–academia collaboration. *Nature Reviews Drug Discovery*, *18*(10), 743–744. https://doi.org/10.1038/d41573-019-00001-2

Global Chemicals Outlook. (2019). United Nations Environment Program. https://www.unep.org/topics/chemicals-and-pollution-action/chemicals-management/global-chemicals-outlook

He, V. F., von Krogh, G., Sirén, C., & Gersdorf, T. (2021). Asymmetries between partners and the success of university-industry research collaborations. *Research Policy*, *50*(10), 104356. https://doi.org/10.1016/j.respol.2021.104356

Hird, N., Ghosh, S., & Kitano, H. (2016). Digital health revolution: Perfect storm or perfect opportunity for pharmaceutical R&D? *Drug Discovery Today*, *21*(6), 900–911. https://doi.org/10.1016/j.drudis.2016.01.010

Jiménez-Luna, J., Grisoni, F., Weskamp, N., & Schneider, G. (2021). Artificial intelligence in drug discovery: Recent advances and future perspectives. *Expert Opinion on Drug Discovery*, *16*(9), 949–959. https://doi.org/10.1080/17460441.2021.1909567

Lugovoi, I., Andritsos, D. A., & Senot, C. (2022). Manufacturing Process Innovation in the Pharmaceutical Industry. *Manufacturing & Service Operations Management (M&SOM)*, *24*(3), 1760–1778. https://doi.org/10.1287/msom.2021.1035

Munos, B. (2009). Lessons from 60 years of pharmaceutical innovation. *Nature Reviews Drug Discovery*, *8*(12), 959–968. https://doi.org/10.1038/nrd2961

Ormond, K. E., Bavamian, S., Becherer, C., Currat, C., Joerger, F., Geiger, T. R., Hiendlmeyer, E., Maurer, J., Staub, T., & Vayena, E. (2024). What are the bottlenecks to

health data sharing in Switzerland? An interview study. *Swiss Medical Weekly*, *154*(1). https://doi.org/10.57187/s.3538

Schneider, P., Walters, W. P., Plowright, A. T., Sieroka, N., Listgarten, J., Goodnow, R. A., Fisher, J., Jansen, J. M., Duca, J. S., Rush, T. S., Zentgraf, M., Hill, J. E., Krutoholow, E., Kohler, M., Blaney, J., Funatsu, K., Luebkemann, C., & Schneider, G. (2020). Rethinking drug design in the artificial intelligence era. *Nature Reviews Drug Discovery*, *19*(5), 353–364. https://doi.org/10.1038/s41573-019-0050-3

Schoy, M. (2025, June 18). Medienmitteilung: Schweiz verliert weiter an Boden beim Zugang zu neuen Medikamenten – Versorgung und Standort gefährdet. *Interpharma*. https://www.interpharma.ch/blog/medienmitteilung-schweiz-verliert-weiter-an-boden-beim-zugang-zu-neuen-medikamenten-versorgung-und-standort-gefaehrdet/

Schuhmacher, A., Gassmann, O., & Hinder, M. (2016). New Innovation Models in Pharmaceutical R&D. In *Value Creation in the Pharmaceutical Industry* (pp. 400–415). John Wiley & Sons, Ltd. https://doi.org/10.1002/9783527693405.ch18

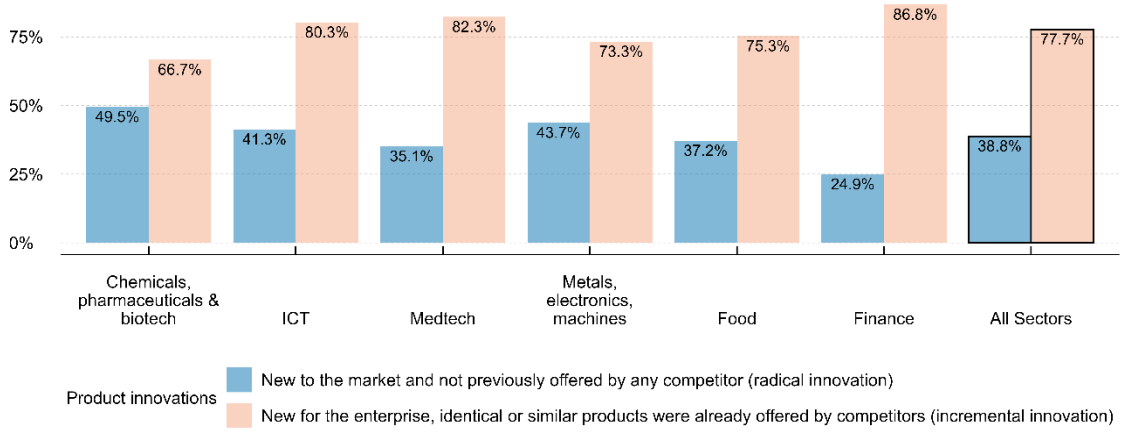
Schuhmacher, A., Germann, P.-G., Trill, H., & Gassmann, O. (2013). Models for open innovation in the pharmaceutical industry. *Drug Discovery Today*, *18*(23), 1133–1137. https://doi.org/10.1016/j.drudis.2013.07.013

Swiss Biotech Report 2025—The power of international alliances. (2025). Swiss Biotech.

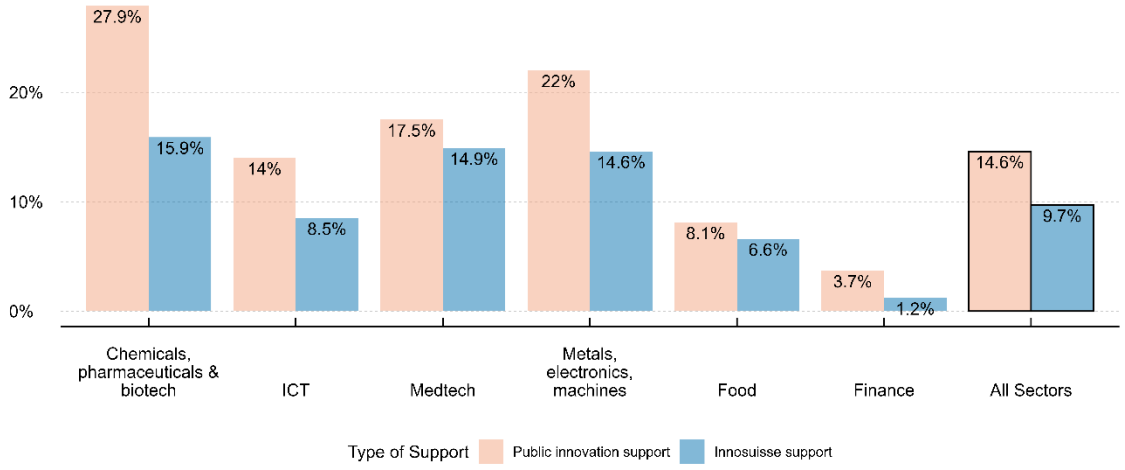
The Importance of the Pharmaceutical Industry for Switzerland. (2024). Interpharma/BAK Economics AG.

Appendix

Appendix table 1. Radical and incremental product innovations by sector (in %) - All sectors



Appendix table 2. Use of public innovation support and Innosuisse support by sector (in %) - All sectors



Appendix table 3. R&D activities by sector (in %) - All sectors