

Innosuisse innovation support: the perspective of firms II

«Evaluation of the Innosuisse survey 2023»
Study commissioned by Innosuisse

Spescha A., Tran S., Wörter M.
Zurich, November 18, 2024



1. Starting point and objectives
2. Summary and key takeaways
3. Surveys 2019, 2021, 2023
 - a) Sample and response rates
 - b) Development of innovation activities
 - c) Market characteristics
 - d) Public innovation funding
 - e) Motives
 - f) Technological potential
 - g) Artificial Intelligence
4. Survey 2023
 - a) Complexity, megatrends and regulations, and digitalization
 - b) Horizon Europe
5. Discussion of the results and outlook
6. Appendix

Starting point and objectives

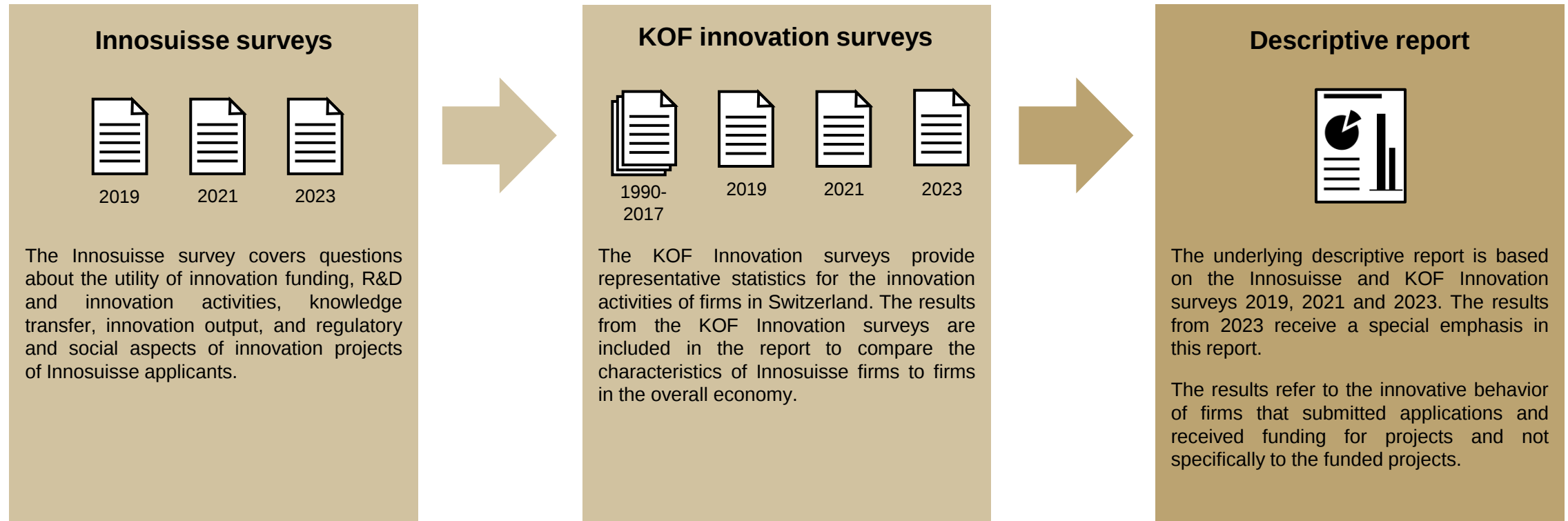
Starting point and objectives

Innosuisse – the Swiss Innovation Agency – is the most important source for innovation support for firms in Switzerland. Its goal is to promote science-based innovation in the interests of economy and society. To know more about its funding clientele, Innosuisse has conducted surveys in cooperation with the KOF Swiss Economic Institute of ETH Zurich (KOF) in 2019, 2021, and 2023. The surveys were sent to all firms which have made an application for Innosuisse funding (funded projects and refused applications). They concentrate on the characteristics, the framework conditions and context of application, and the outcomes of the population of Innosuisse applications (Innosuisse firms).

The underlying descriptive report is based on the results from the three surveys. It aims to achieve the following objectives:

- Presenting a series of characteristics of firms funded by Innosuisse over the three survey periods 2019, 2021, 2023.
- Presentation of questions regarding the general development of the innovation activities of Innosuisse applications (funded projects and refused applications) and the impact of complexity, megatrends, regulation, and digitalization on these innovation activities.
- How the innovation projects submitted to Innosuisse differ from other innovation projects of the applicants.

The presented indicators provide empirical facts on innovation promotion in Switzerland and thus strengthen the basis for evidence-based policy-making. They are descriptive in nature and do not provide a causal analysis. For the latter see the difference-in-differences study also implemented by KOF (ref.).



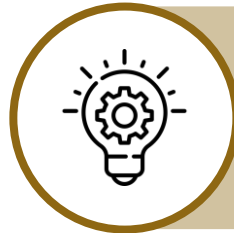
Summary and key takeaways



The **past and the expected development of innovation activities** of applicants for Innosuisse support (Innosuisse firms) has on average **decreased from 2019 to 2023**. The results indicate a **decrease in innovation dynamics** at the firm level, in terms of both, past performance and future expectations. However, the majority of the companies are still showing increasing or at least stable innovation activities. Only few firms show a decrease.



The **utility of the Innosuisse innovation support** has **decreased from 2019 to 2023**. This finding holds for both, applicants with approved and refused innovation projects and/or checks. However, in 2023 **65% of the firms** still report the **utility** of the Innosuisse **innovation support** as **high or even very high**.



Most firms rate their **innovations as in-between incremental and radical**. **No shift towards more radical innovations** can be observed over the period 2019-2023. **27%** of the innovations were reported to be **incremental or highly incremental** and **33% radical or highly radical** in 2023. 40% of the innovations of the firms cannot be clearly assigned to either category.



The general economic **characteristics of Innosuisse firms remain similar** over the period 2019-2023. However, they have become **smaller, younger, and less export-oriented**, which suggests that Innosuisse has (also) become more interesting for these kind of firms. This is an indication that the proportion of start-ups among Innosuisse firms has increased.



Like in the overall economy in Switzerland, the **innovation input indicators** of Innosuisse firms have **increased** while the **innovation output** indicators have **decreased**. It has become more difficult and expensive for Innosuisse firms to generate advanced innovations. However, Innosuisse firms still **produce significantly more new products/services** than the average R&D-active firm, especially those products/services that are new to the market.



Compared to the average R&D-firm, Innosuisse firms are **younger**, have a **higher share of academics**, face **less competition**, have **less investments**, and **higher exports**. Moreover, within innovative firms, they have **higher R&D and innovation expenditures**. Innosuisse firms also have **higher sales shares of innovative products/services**, especially for those products/services new to the market.



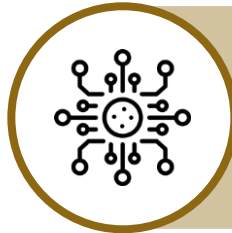
The **biggest motive** to apply for innovation support is access to **technological knowledge**, closely followed by **financial resources**. Less important are motives regarding access to human resources and higher market chances. 63% of Innosuisse firms rate the **technological potential** in their area of activity as **(very) high**.



About 2/3 of the firms pursue **other innovation projects** next to those projects submitted to Innosuisse. Compared to the other innovation projects, **Innosuisse projects** have a **higher degree of novelty**, are **technically more complex** and are subject to **higher market and technical risk**. In addition, they are more often **used for knowledge and technology transfer**. However, overall the two groups of projects are quite similar to each other.



Innosuisse funds those firms that **face higher challenges in digitalization, deglobalization, demographic development, and social issues** for their innovation activities. Overall, digitalization and ecological sustainability are rated not as a challenge but as an opportunity.



Digitalization is of high importance to the innovation activities of the Innosuisse firms. The **lack of skilled labor** is especially **important** in this context. In contrast, the **transfer of knowledge from higher education institutions is less helpful** in handling the interplay between the innovation activities and digitalization.



The share of Innosuisse firms that have declared using **systems based on artificial intelligence** has been **increasing from 22% to 33%** over the period 2019-2023. On average Innosuisse firms also use AI more frequently than R&D-active firms.

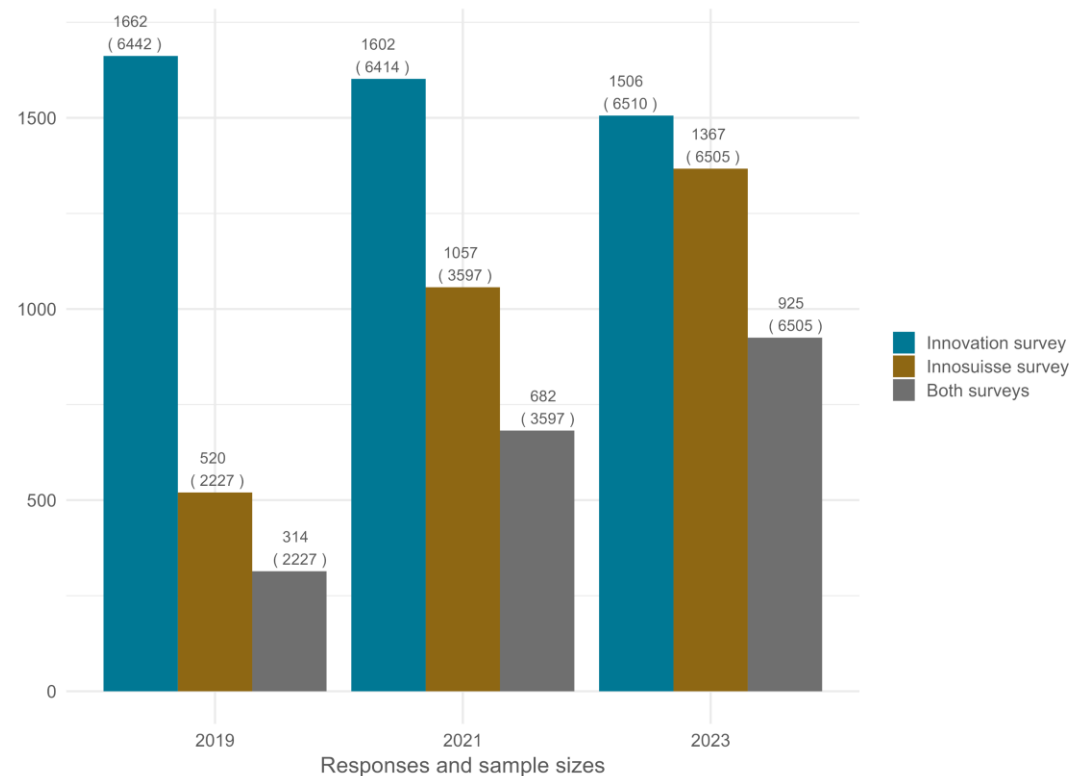


47% of all Innosuisse applicants responded that they will incur **(very) negative consequences** from **Switzerland's exclusion from Horizon Europe**. Very few firms reported that the exclusion from Horizon Europe will be positive or very positive.

Sample sizes and response rates of the surveys conducted in 2019, 2021, 2023

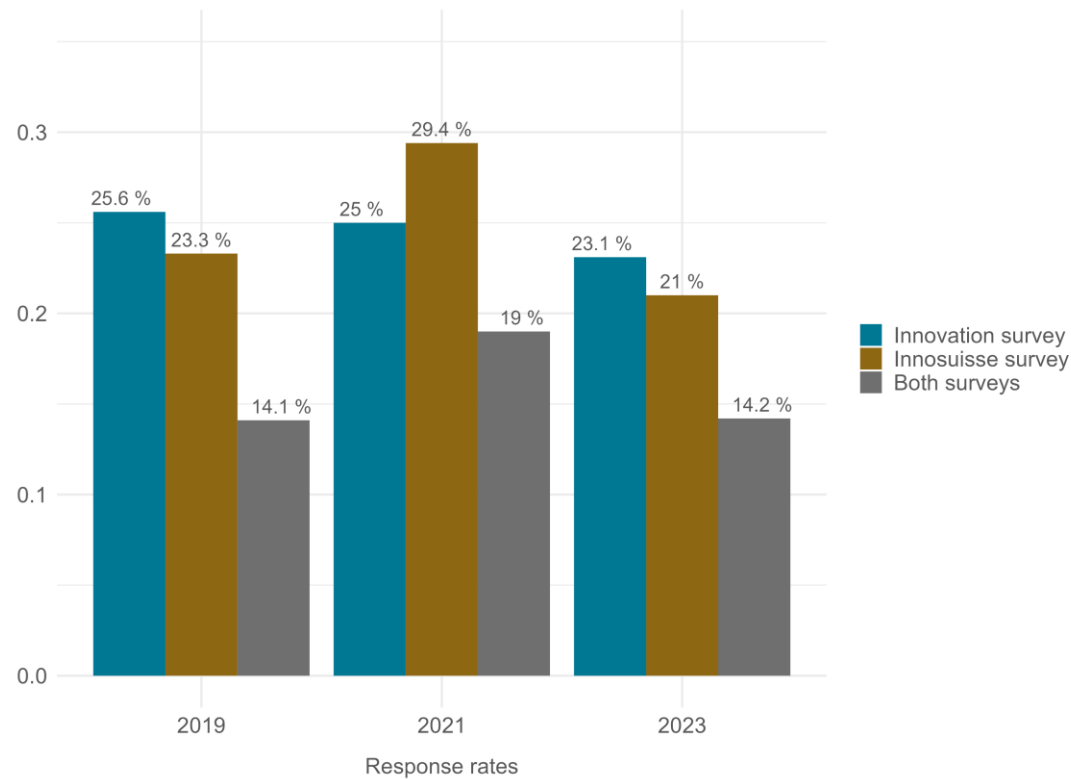
Sample sizes of the surveys conducted in 2019, 2021, 2023

Sample sizes and responses of the KOF innovation survey, the Innosuisse survey, and both surveys



- The underlying report is based on the KOF innovation surveys and Innosuisse surveys conducted in spring 2019, 2021 and 2023.
- The figure plots the number of responses for both surveys. For example, in 2023, 1'506 firms answered the KOF innovation survey, 1'367 the Innosuisse survey, and 925 answered both surveys. The numbers in brackets represent the total sample sizes. Hence, the total sample size contains firms that responded and those firms that did not respond.
- In each survey year, the KOF innovation survey was sent to around 6'500 firms. About 1'600 out of 6'500 firms answered the survey. The number of responses to the KOF Innovation survey declined somewhat over time.
- The sample size for the Innosuisse survey includes all firms that applied for project support (national and international projects) and/or innovation checks as well as the firms that have actually been funded. If a firm applied in 2019 or 2021, it is retained in later waves. The sample size for the Innosuisse survey thus grew from 2'227 in 2019 to 6'505 in 2023. Naturally, the number of firms that have answered the Innosuisse survey also grew from 520 to 1'367.
- Due to the increase in the sample size for the Innosuisse survey, the number of respondents answering both surveys grew over time.

Response rates of the KOF innovation survey, the Innosuisse survey, and both surveys

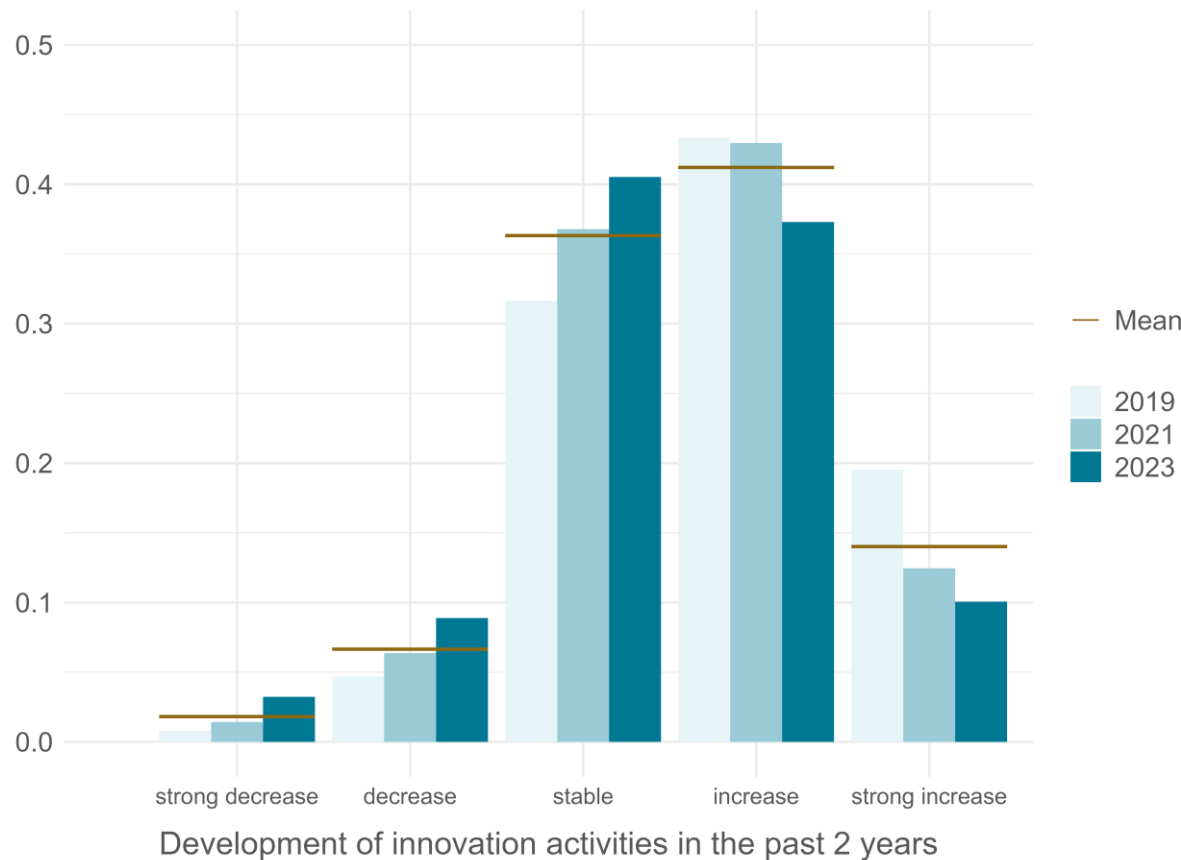


- In 2023, 23.1% answered the KOF innovation survey, 21.0% the Innosuisse survey, and 14.2% answered both, the KOF innovation survey and the Innosuisse survey (last three column of the left figure).
- The response rates for the KOF innovation survey have been decreasing over time. This is a historic trend that has been going on since 2000. In contrast, the response rates for the Innosuisse survey have remained more stable over time, despite the fact of a marked increase in the sample size for the Innosuisse survey.
- Note that throughout the presentation we show **on the Y-Axes the shares of firms, which range between 0 and 1**; for example, a share of 0.35 implies 35% of firms.

Development of innovation activities

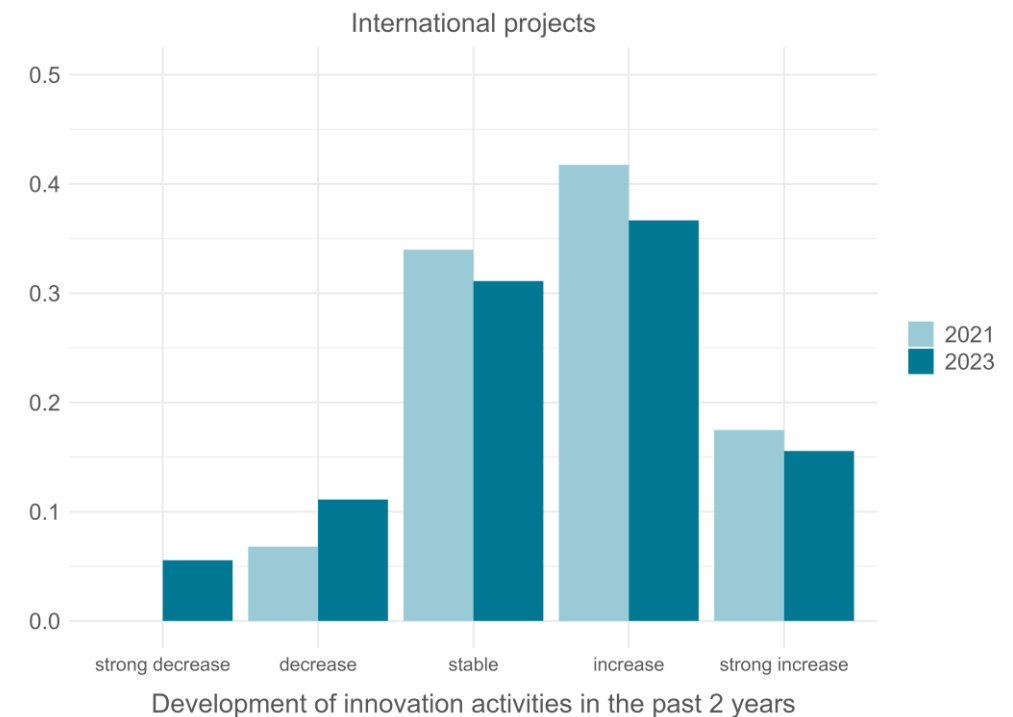
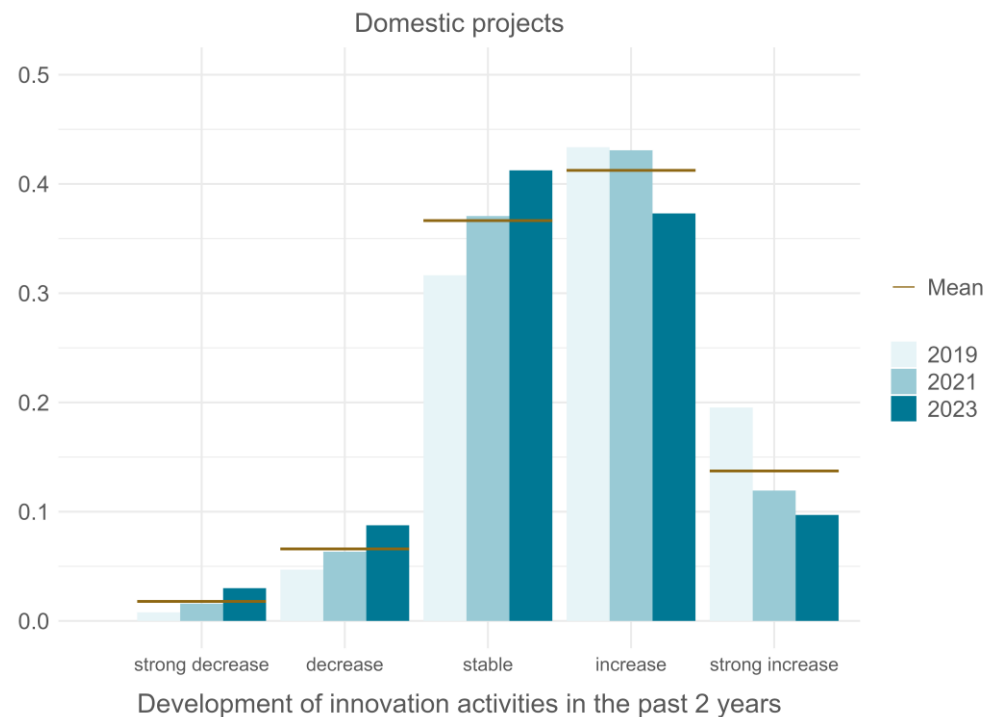
(Innosuisse surveys)

Estimated development of innovation activities in the past 2 years – all Innosuisse applicants/firms



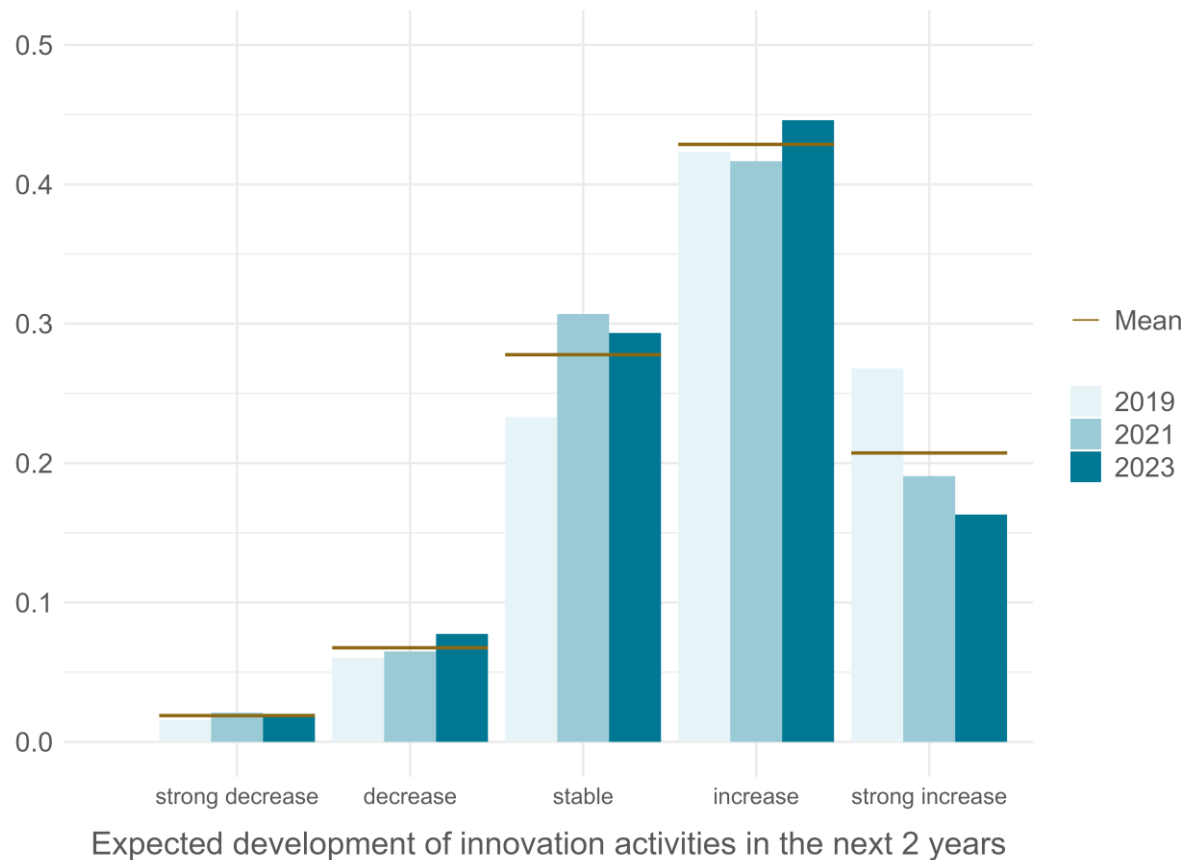
- Innosuisse applicants, which are firms that have submitted an application for national/international project support and/or innovation check to Innosuisse, report that the past development of their innovation activities have decreased from 2019 to 2023.
- Over those four years, more firms report a decrease or strong decrease and less firms report an increase or strong increase in their innovation activities. The share of firms with a stable development has also increased.
- However, a lot more firms still report an increase or even a strong increase in their innovation activities than a decrease or strong decrease. Hence, the figure shows that the level of innovation activities did not decrease, only the growth of the innovation activities did. We still observe a positive development of innovation activities, however, the positive dynamic has diminished.
- The estimated development of past innovation activities for refused and approved projects indicate a similar pattern as we have seen with the overall pattern, see Appendix page 61.

Estimated development of innovation activities in the past 2 years – firms/applicants with domestic vs. international projects



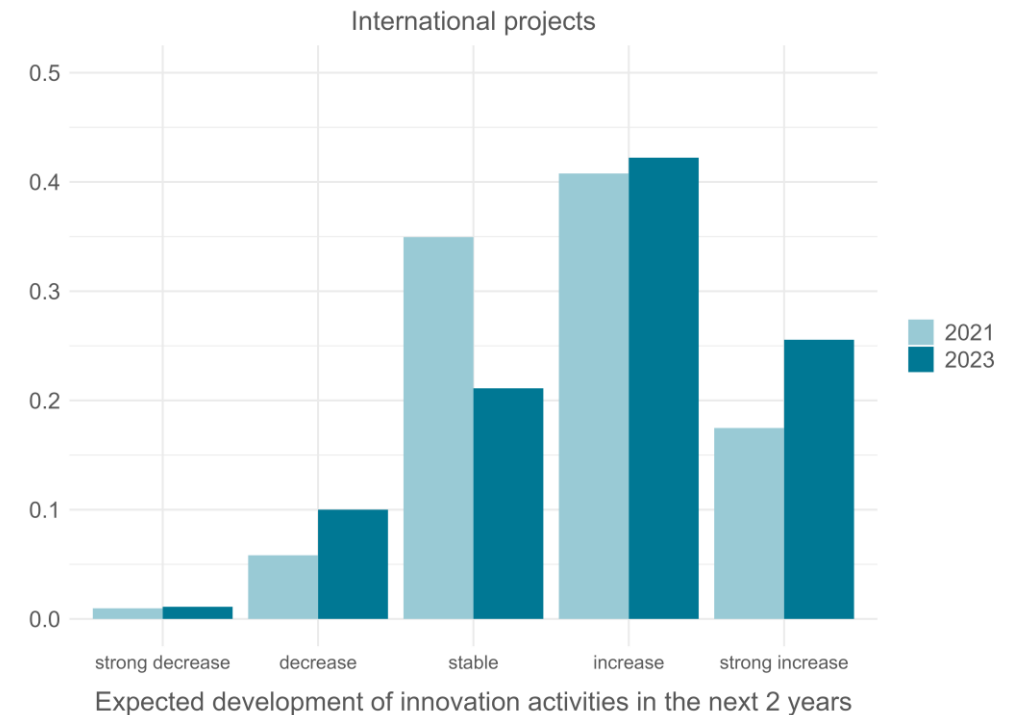
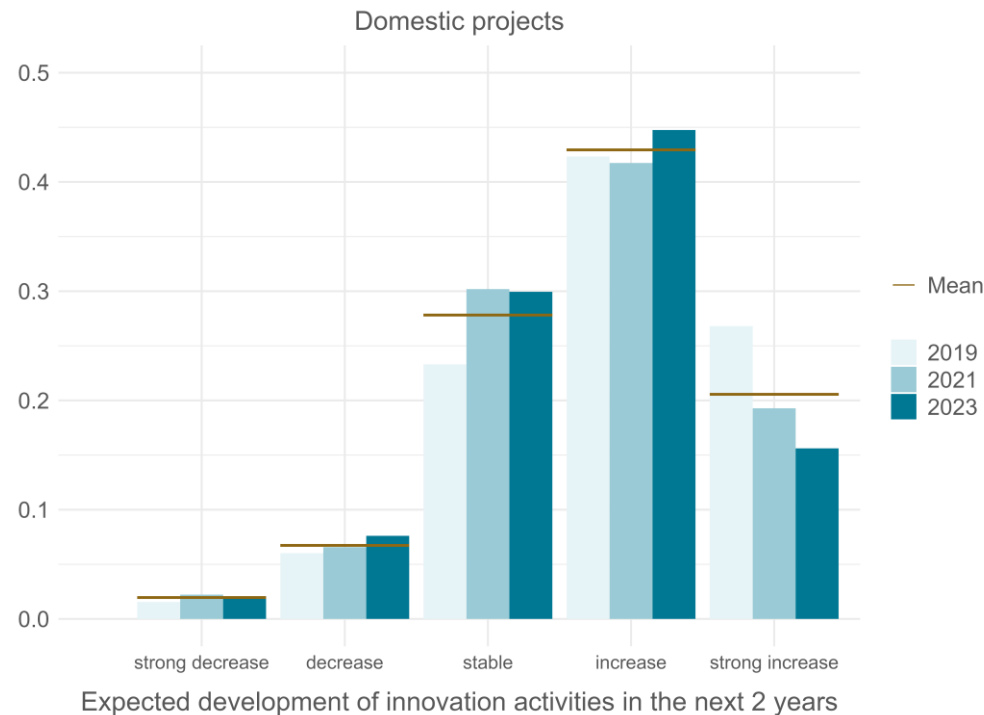
Domestic applications appears to have a similar pattern as the applicants overall. However, it is noticeable that firms applying for international projects have on average more frequently reported a strong increase or strong decrease. Hence, the variation in the development of the innovation activities is higher.

Estimated development of innovation activities in the next 2 years – all Innosuisse applicants/firms



- Innosuisse applicants further report that the expected development of their innovation activities in the future has decreased from 2019 to 2023, too, although this decrease has been somewhat weaker compared to the development of innovation activities in the past. Hence, firms incorporated the decrease of the development of their innovation activities in the past into the expectations for the development of their innovation activities in the future.
- The results indicate a decrease in dynamics in terms of both past performance and future expectations.
- When compared with the development of the past innovation activities, firms expected that their innovation activities would increase by more in the future than they had in fact increased. Hence, Innosuisse firms are in general too optimistic about the growth of their innovation activities. For instance, in 2019, 26.8% of the firms expected a strong increase in their innovation activity. In 2021, however, only 12.5% of the firms had actually recorded such an increase. Similarly, 19.1% of the firms expected a strong increase in their innovation activity in 2021, while only 10.1% have been able to achieve this in retrospect.
- See Appendix page 62 for a figure differentiating between approved and refused projects. Firms with refused projects have a more positive assessment of their future innovation activities than firms with approved projects.

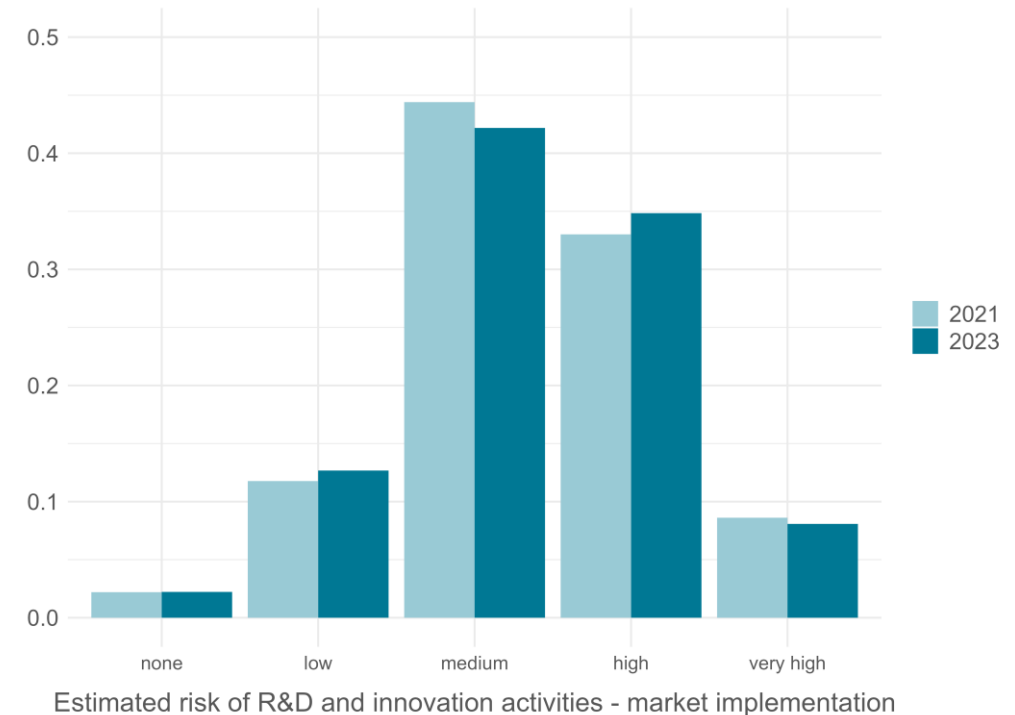
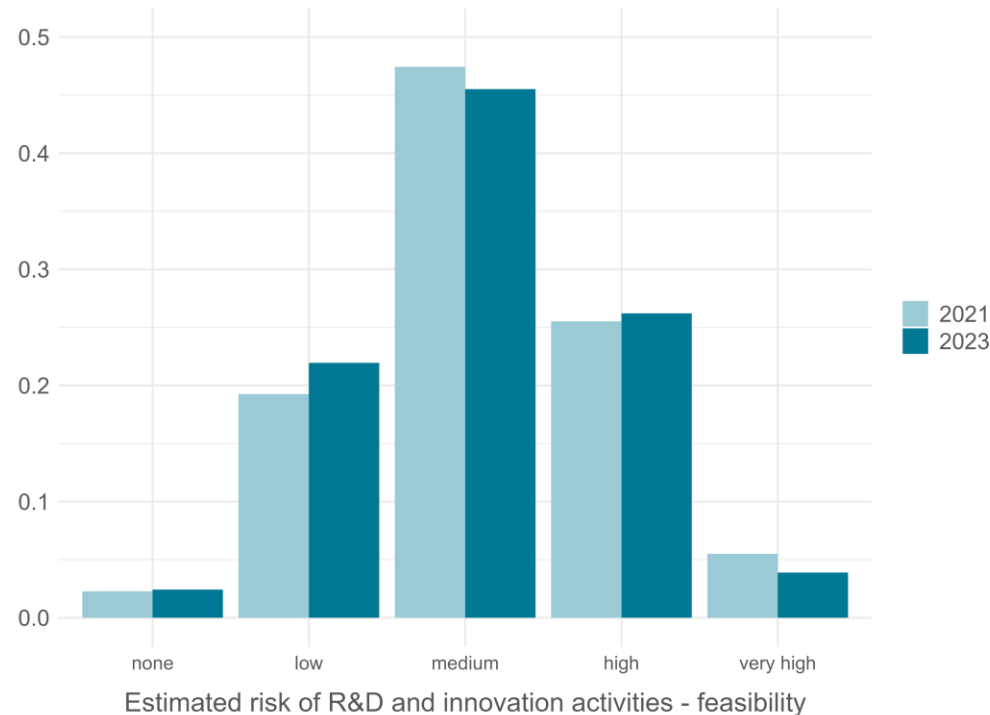
Estimated development of innovation activities in the next 2 years – firms/applicants with domestic vs. international projects



- Generally, the applicants for domestic projects reveal a similar pattern as the applicants overall. They also account for the vast majority of cases.
- For the international applicants, we can see a shift from «stable» to «strong increase» from 2021 to 2023. Hence, firms applying for international projects with other firms or research partners outside of Switzerland more frequently expect a stronger increase in innovation activities in the future.

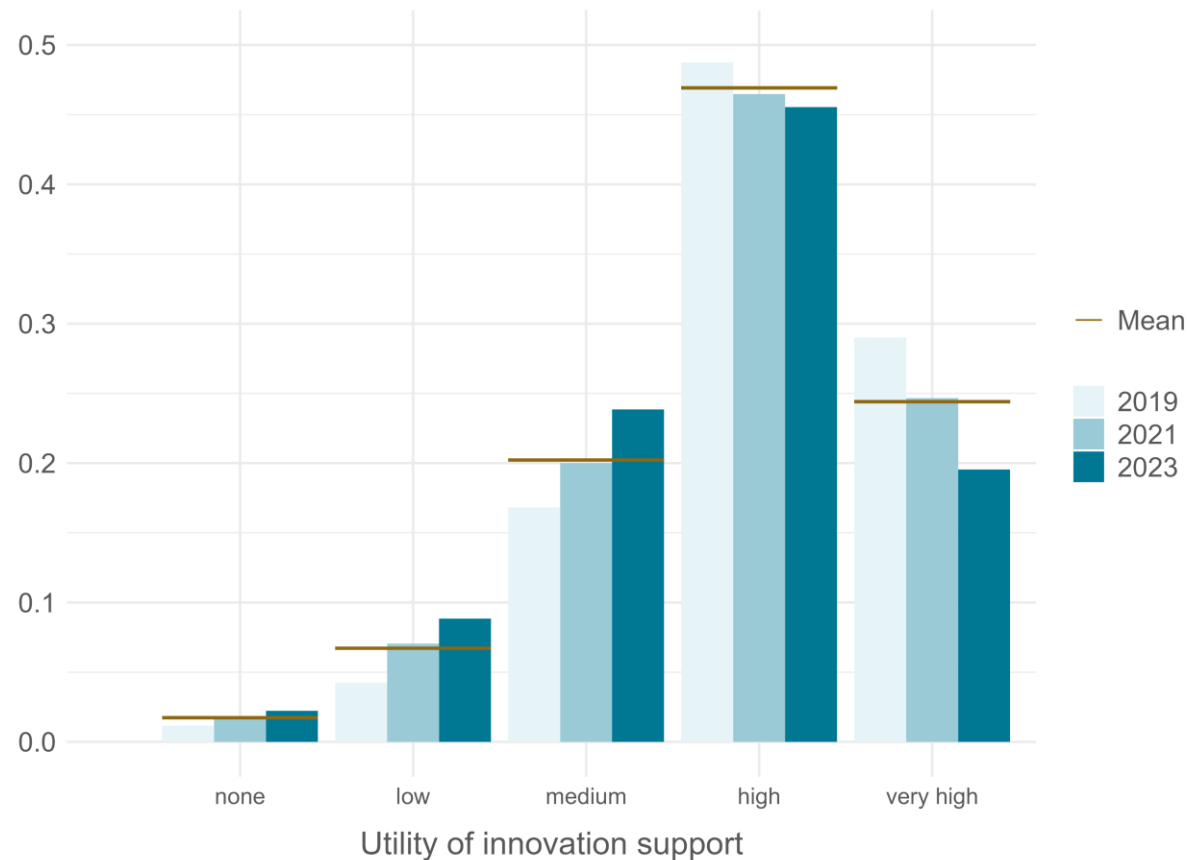
Estimated risk of R&D and innovation activities (feasibility and market implementation)

Estimated risk of R&D and innovation activities in terms of feasibility and market implementation – all Innosuisse applicants/firms



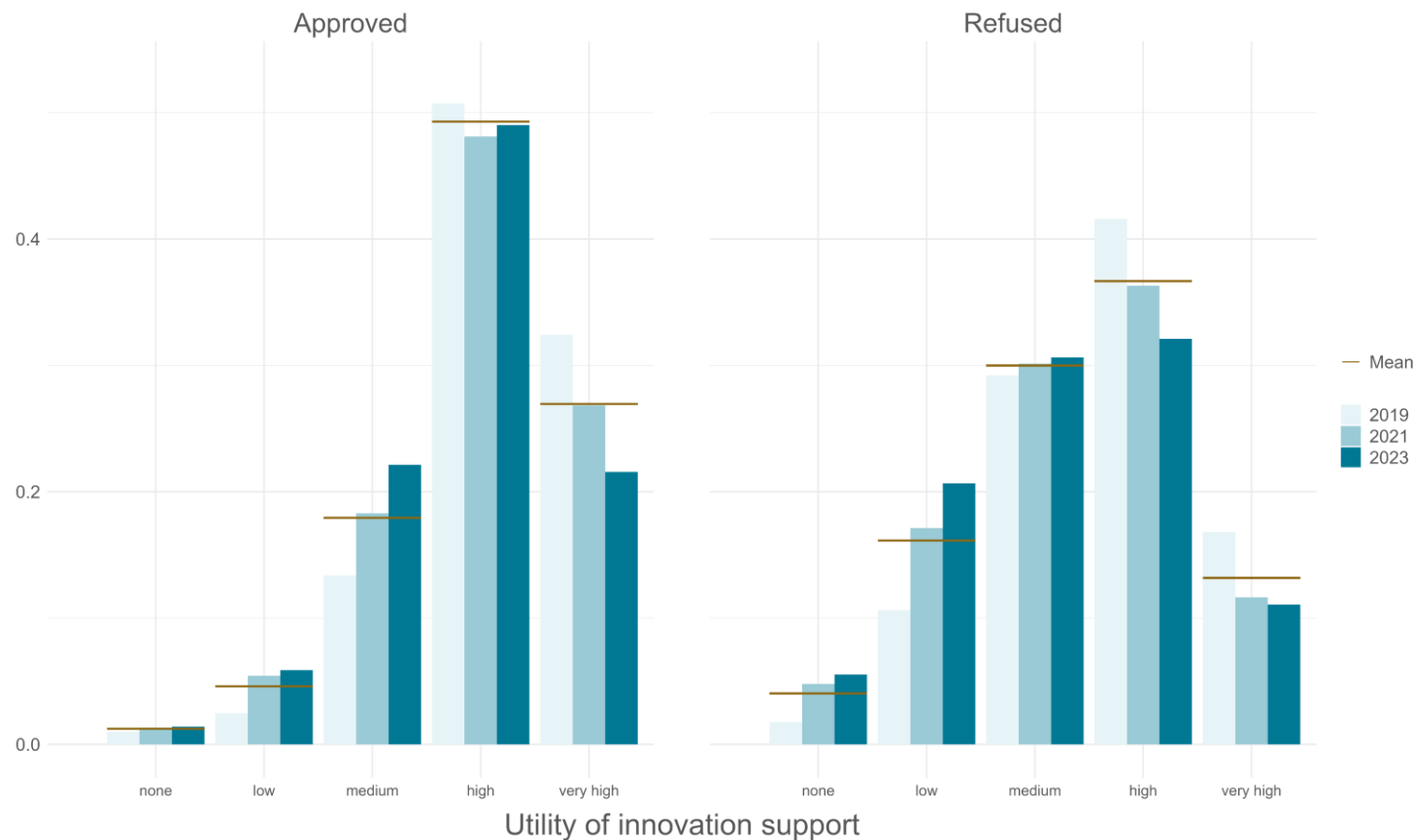
- Innosuisse applicants report that the risk of R&D and innovation activities in terms of market implementation is larger than the risk of R&D and innovation activities in terms of feasibility. See Appendix, page 63, for the difference between approved and refused projects, where both categories show a similar pattern, too.
- The figures indicate that there is only limited variation over time for these two risk factors. They are very similar for both time periods 2021 and 2023.

Utility of innovation support – all Innosuisse applicants/firms



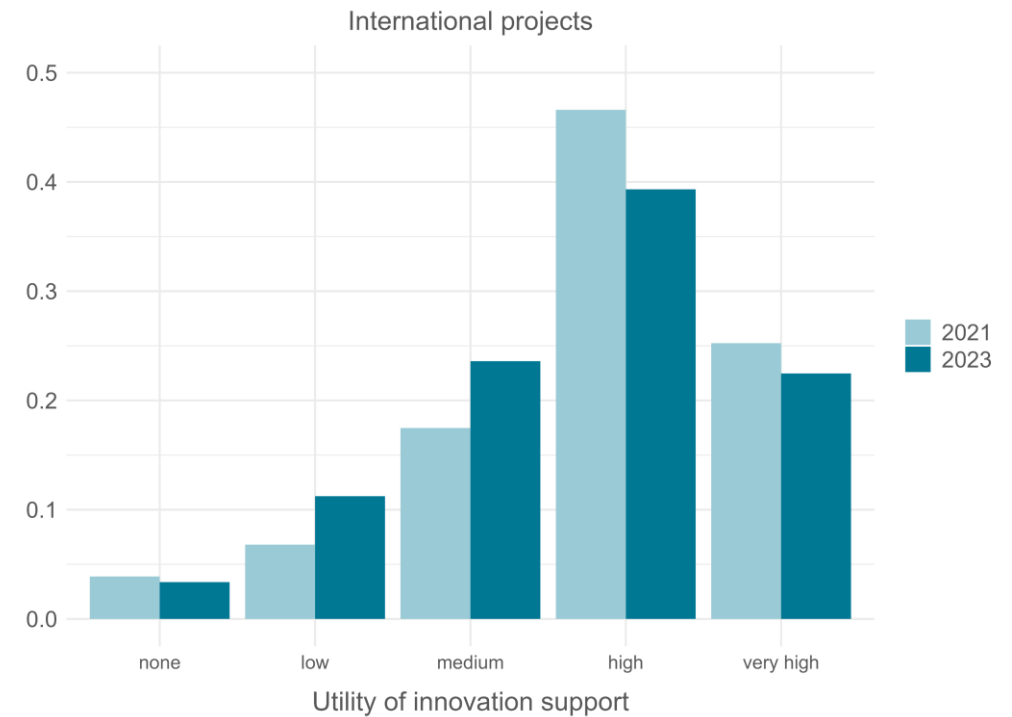
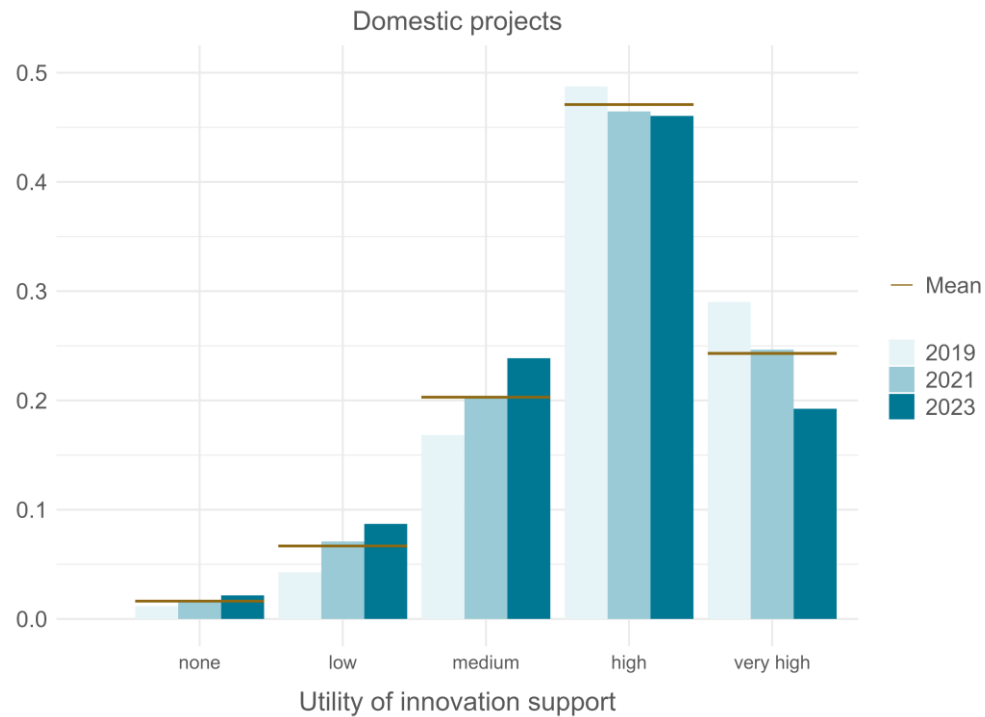
- Over all three survey periods (horizontal bars), Innosuisse applicants rate the utility of the Innosuisse funding as high (46.9%) or very high (24.4%). This results in a total of 71.3%. Only few firms rate the overall utility as low. Almost no firms report that Innosuisse funding has no utility.
- In 2023, 65.1% of the Innosuisse applicants rated the utility of the innovation support to be high or very high. In 2021 this number was 77.1%.
- Thus, there has been a decrease in the overall utility of the Innosuisse funding over the three survey years. In 2023, relatively fewer Innosuisse applicants rated the overall utility as high or very high compared to 2019. This may be an indication of a change in the innovation landscape and might suggest that the need of the applicants has partly changed from 2019-2023, resulting in a potential mismatch of the Innosuisse funding programs and the needs of the applicants. It might also be related to the change in the characteristics of the applicants, especially towards smaller firms.

Utility of innovation support – firms with approved vs. refused projects



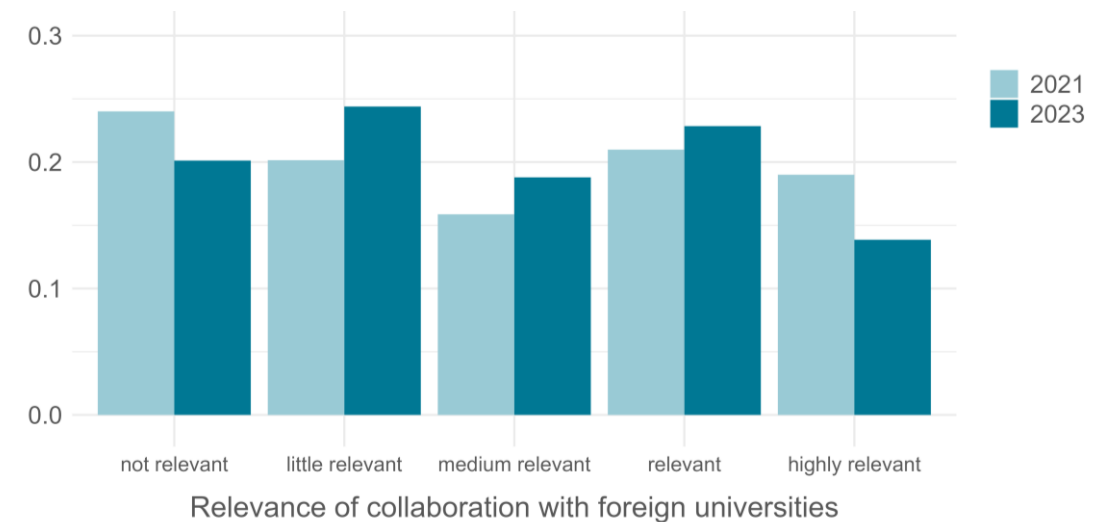
- The firms whose projects got accepted responded with a much higher utility than the firms whose projects got refused.
- Importantly, there is a decrease in the utility of innovation support over time for both, accepted and refused projects.
- The proportion of firms that do not see any benefit has remained consistently low among the supported firms. The growth in the «low», «medium», and «high» utility categories, at the expense of the «very high» utility, implies a relative reduction in the fundamentally positive utility of the support.
- Innosuisse's utility is high irrespective of the applicants funding status (approved or refused). For the firms with refused projects, this may, on the one hand, reflect a hypothetical utility. On the other hand, it may be the utility of setting up a partnership with a university that has been exploited despite no funding.

Utility of innovation support – firms with domestic vs. international projects



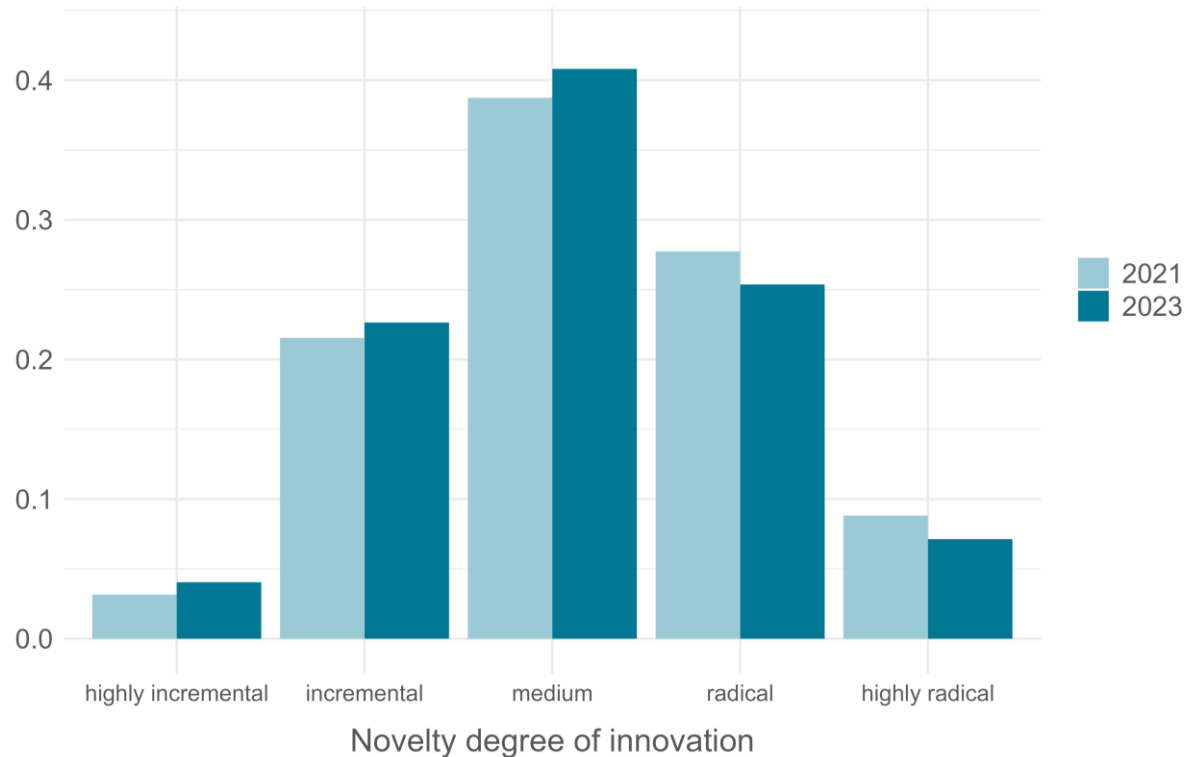
Innosuisse applicants for international innovation projects demonstrate a similar utility profile compared to firms with domestic innovation projects.

Relevance of collaborations with foreign firms and universities – all Innosuisse applicants/firms



- Innosuisse applicants rate the collaboration with foreign firms (left figure) as more relevant than the collaboration with foreign universities (right figure).
- When compared over time, the relevance of collaboration with both, foreign firms as well as foreign universities, has decreased from 2021 to 2023 for the categories “highly relevant” and “not relevant” with a subsequent shift towards the middle categories.
- It is noticeable that «highly relevant» has decrease for both, the relevance of collaboration with foreign firms as well as with foreign universities.
- See Appendix page 64 for a figure differentiated between approved and refused projects.

Novelty degree of innovations at the firm level – all Innosuisse applicants/firms



- Innosuisse applicants rate the degree of novelty of their innovations most often as «medium» (38.7% in 2021, 40.8% in 2023). However, there are as many firms that report «radical» as there are firms that report «incremental».
- Over time, the degree of novelty has decreased only little from 2021 to 2023.
- In 2023 26.7% of the Innosuisse applicants rate the novelty degree of their innovations as «(highly) incremental». Whereas 32.5% rate it to be as «(highly) radical».
- Importantly, there has not been a significant shift from incremental to radical projects.
- Moreover, there is no difference to be observed between approved and refused projects, see Appendix page 65.

Market characteristics

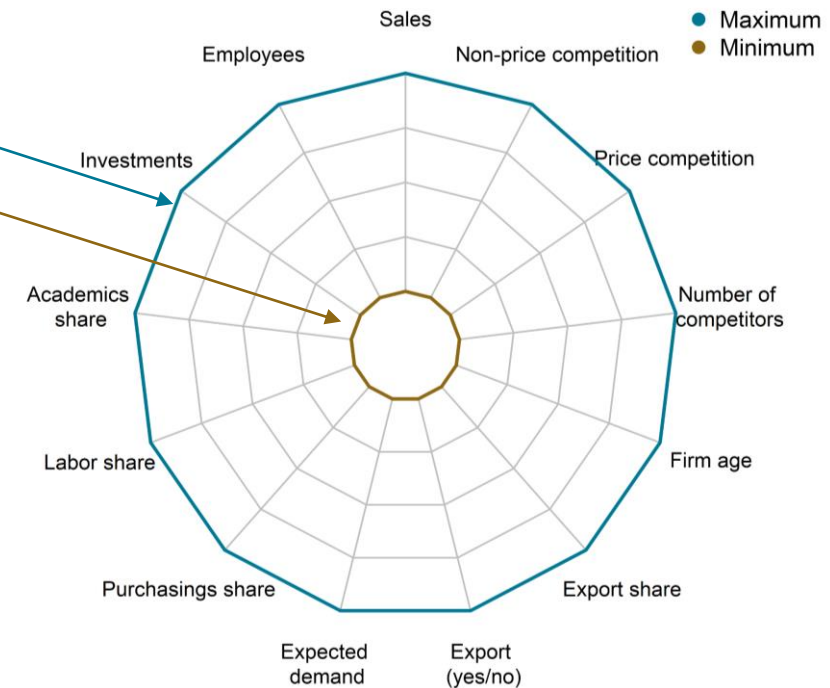
(KOF Innovation surveys)

In this section we compare the market characteristics of Innosuisse firms with other groups of firms in the economy, such as the sample of R&D firms. The following table describes the variables we use for this particular comparison:

Variable	Description
Sales	Total firm sales, in CHF
Employees	Number of employees, full-time equivalent
Investments	Fixed capital investments, in CHF
Academics share	Share of employees with a tertiary degree
Labor share	Sales share of labour costs
Purchasings share	Sales share of intermediate inputs
Expected demand	5-point ordinal scale, from very low (1) to very high demand (5)
Export yes/no	Binary variable (0/1) whether firm exports or not
Export share	Sales share of exports
Firm age	Firm age in years
Number of competitors	Total number of competitors
Price competition	5-point ordinal scale, from very low (1) to very high price competition (5)
Non-price competition*	5-point ordinal scale, from very low (1) to very high non-price competition (5)

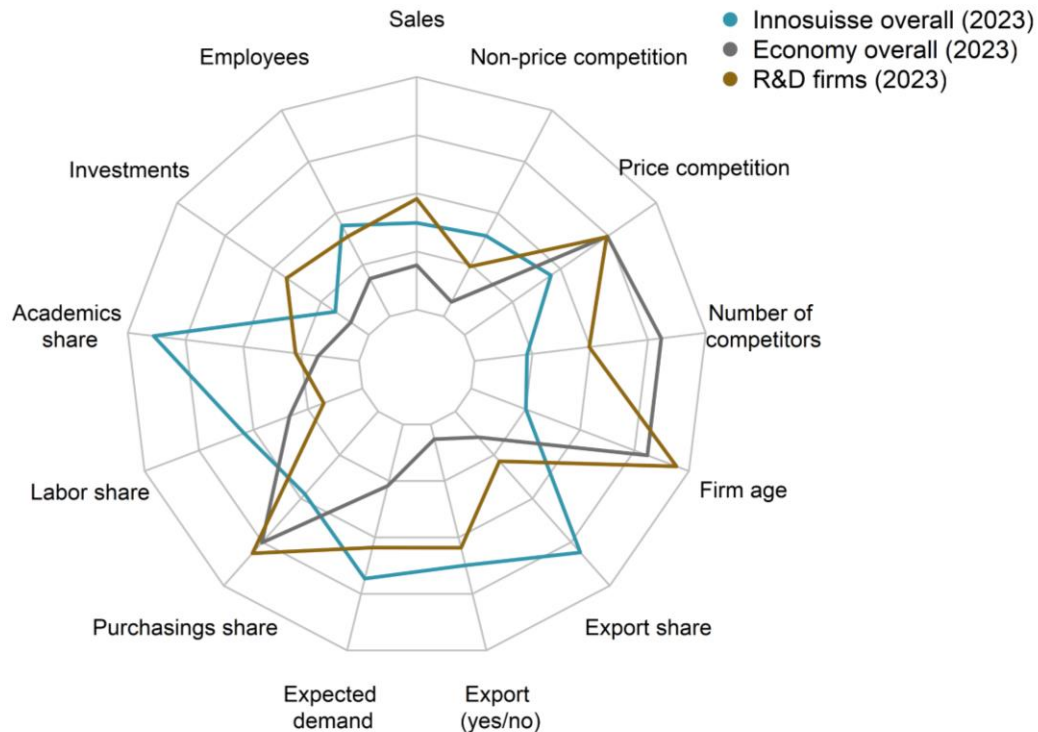
*Non-price competition refers to product differentiation ("customisation"), product quality, (frequent) introduction of new products, technical advantage, flexibility in customer requirements, and services.

Variable	Minimum	Maximum
Sales	5 Mio. CHF	800 Mio. CHF
Employees	5 Employees	220 Employees
Investment	500'000 CHF	2.5 Mio. CHF
Academics share	5%	60%
Labor share	35%	55%
Purchasing share	15%	40%
Expected demand	3	4
Export (yes/no)	20%	75%
Export share	30%	65%
Firm age	25 Years	60 Years
Number of competitors	5 Competitors	15 Competitors
Price competition	3	4
Non-price competition	3	4



The values for the minima and maxima are chosen in such a way that relevant comparisons between firms in the economy overall, R&D firms, and the Innosuisse firms throughout the years are possible. The values plotted in the spider will be the averages of the respective groups. Because the quantitative variables are right skewed, their respective medians will be lower.

Innosuisse firms vs. firms in the overall economy vs. R&D-active firms



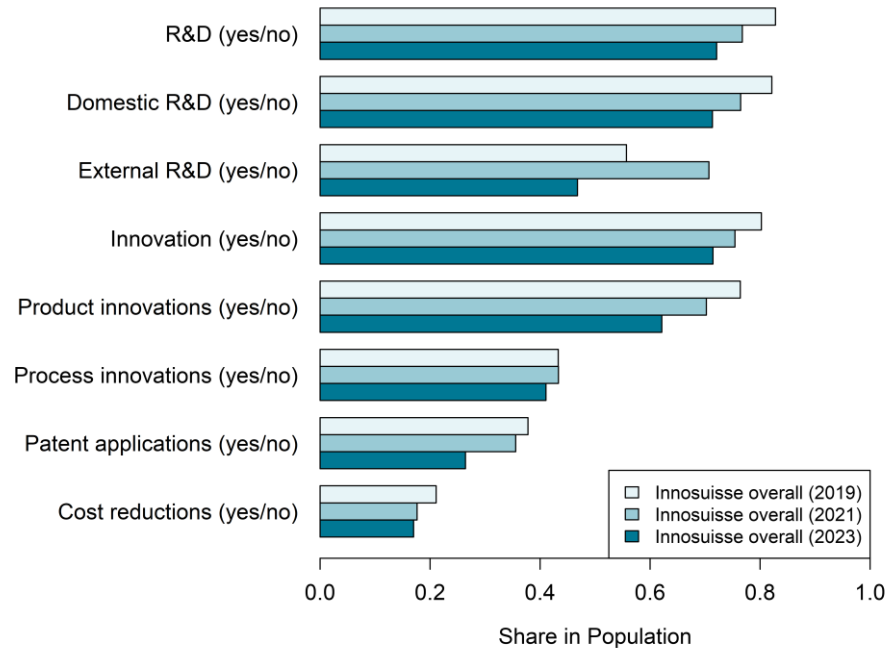
- Innosuisse firms are very different from the average firm in the economy. They are more similar to the R&D-active firms than to the average firm in the economy.
- Innosuisse are generally much younger than the R&D-active firms, have less competitors, less investments, and are less exposed to price competition. In contrast, they have higher labor shares, a higher share of academics, and a higher sales share of exports. In terms of size, Innosuisse firms are comparable to the average R&D-active firm.
- These patterns reflect that Innosuisse firms include many start-ups, are more knowledge based, more active on international markets, and have smaller, less price-competitive markets.

Innosuisse firms over time



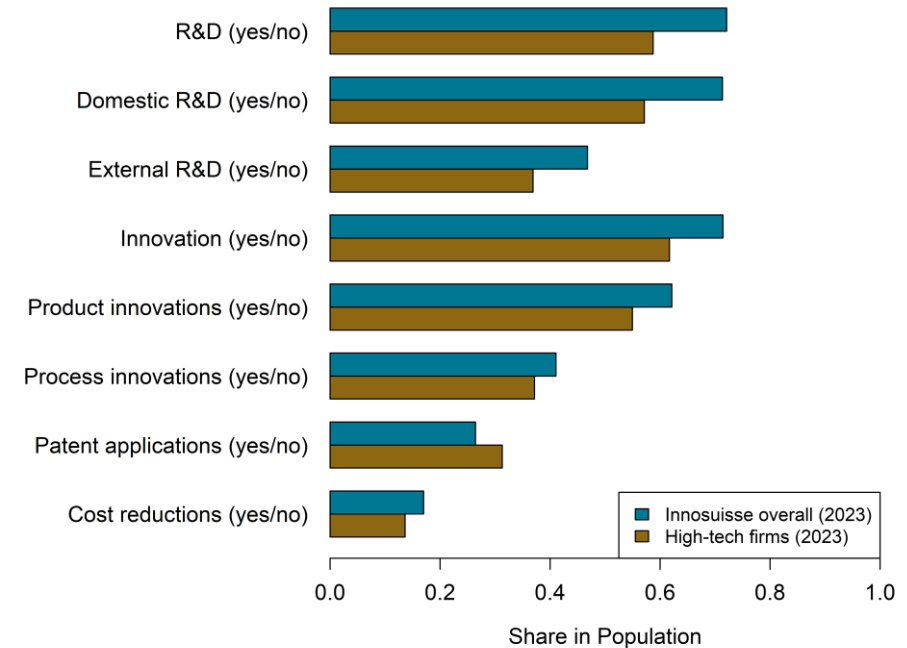
- Over time, Innosuisse firms indicate reduced export intensity as well as purchasing shares. This implies that they are focusing more on the Swiss market and are less dependent on suppliers.
- They have also become smaller in terms of employees and sales, and they reduced their fixed capital investments.
- In all other categories, the Innosuisse applicants have remained more similar over the three periods.
- The characteristics of the clientele have changed and Innosuisse has become more interesting for smaller firms.

Binary innovation indicators – all Innosuisse applicants



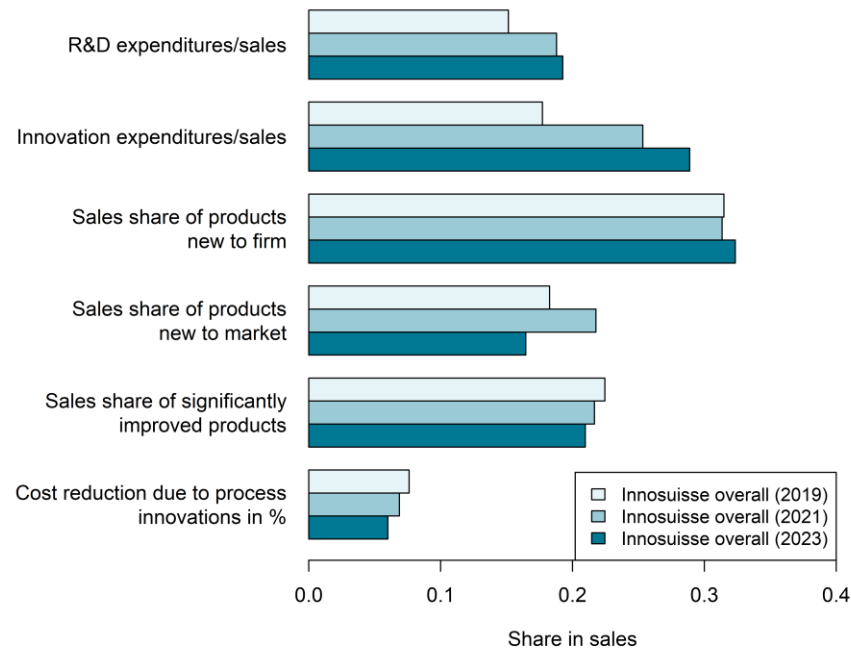
- The Innosuisse applicants demonstrate a decrease in all the binary innovation indicators over time, for both, innovation input and output indicators.
- This decrease is analogous to the decrease in the binary innovation indicators we can observe for Switzerland in general (see Spescha and Wörter 2022).

Binary innovation indicators – Innosuisse vs. High-tech firms



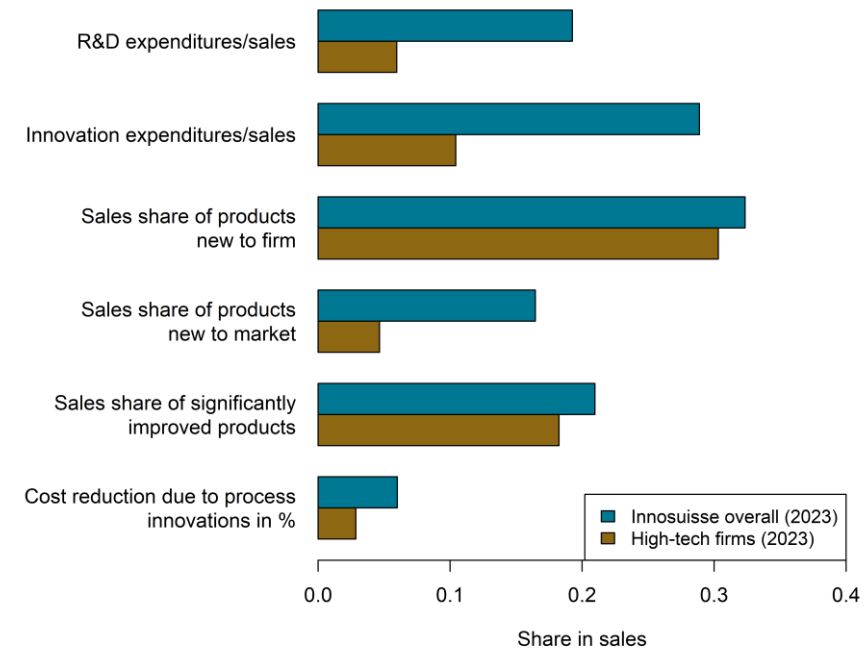
- This figure shows a comparison for the binary innovation indicators between the average high-tech firm and the average Innosuisse firm.
- Innosuisse firms score higher on almost all indicators, even though the values for the High-tech firms are already high when compared to the firms in the overall economy.
- When compared with the numbers from 2019, the gap between the Innosuisse firms and the High-tech firms has become smaller.

Quantitative innovation indicators – all Innosuisse applicants



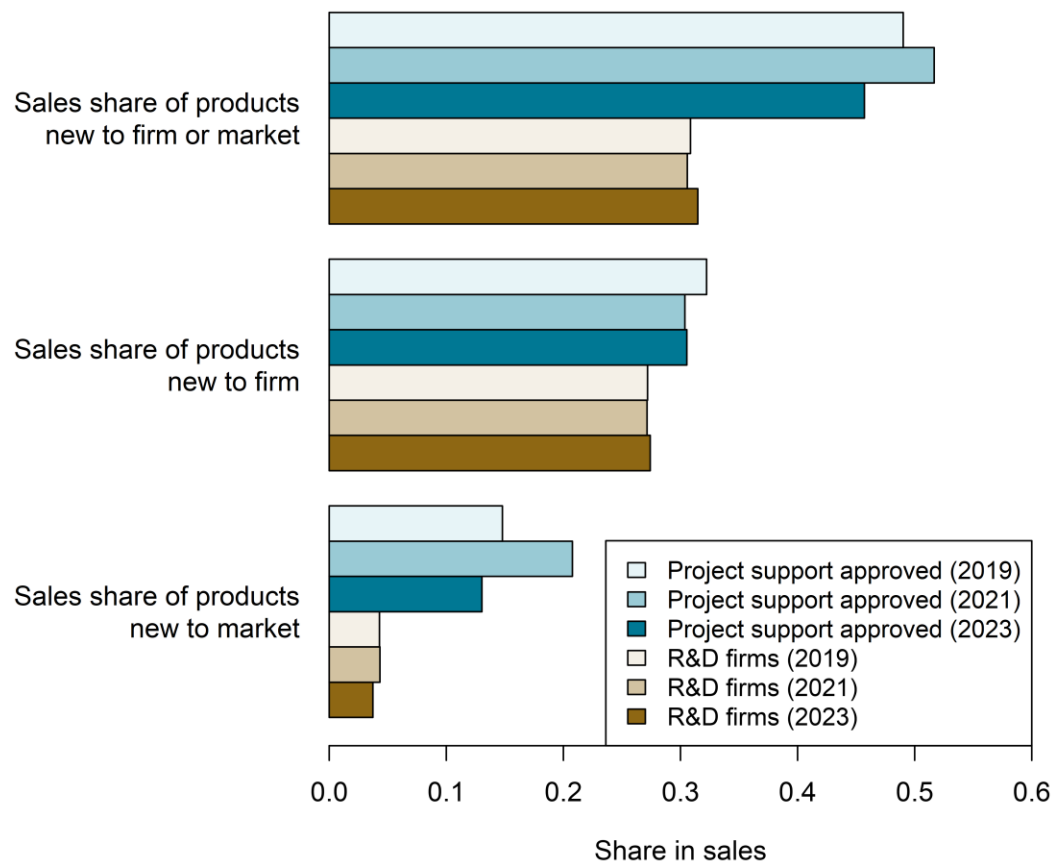
- Innosuisse applicants indicate an increase in both quantitative innovation input indicators, R&D and innovation expenditures.
- However, within the quantitative innovation output indicators, especially in the sales share of products new to markets, Innosuisse applicants display a decrease. These are, once again, the same pattern we can observe for the Swiss economy in general.
- Given the relative increase in innovation input and the decline of innovation output in terms of «radical» innovations (sales share of products new to the market), it appears to have become more difficult/expensive for Innosuisse firms to generate more advanced innovations.

Quantitative innovation indicators – Innosuisse vs. High-tech firms



- Innosuisse applicants have much higher R&D expenditures and innovation expenditures than the average High-tech firm.
- The same holds for the innovation output indicators. Innosuisse firms score higher on all indicators than the average High-tech firm. The difference is especially large for products new to the market (more radical innovations).

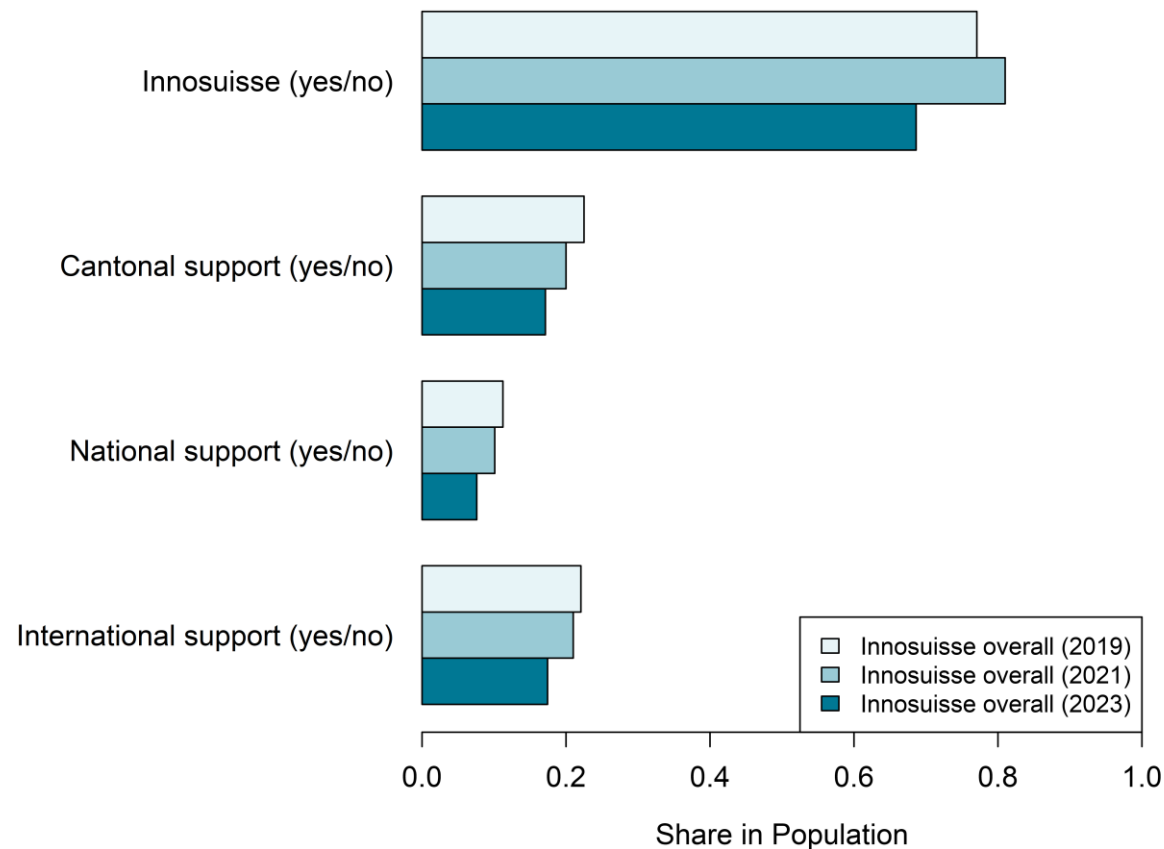
Sales share of products new to firm or market – Innosuisse applicants with approved project supports vs. R&D firms



- In 2023, the average share of sales from product or service innovations among R&D-active firms that have not applied for support is 31%; 27% of sales come from innovations new to the firm and 4% from sales of innovations new to the market. These figures are significantly higher for firms with an approved Innosuisse project support: the share of sales from product or service innovations is almost 46%; 31% of the sales are attributable to innovations new to the firm and 13% to innovations new to the market.
- The average R&D-active firm shows only few changes over time. The Innosuisse firms show somewhat more variation. The sales share of innovation increased in 2021 and then decreased in 2023, such that the level in 2023 is similar to 2019. This development is mainly attributable to the sales share of products new to the market.

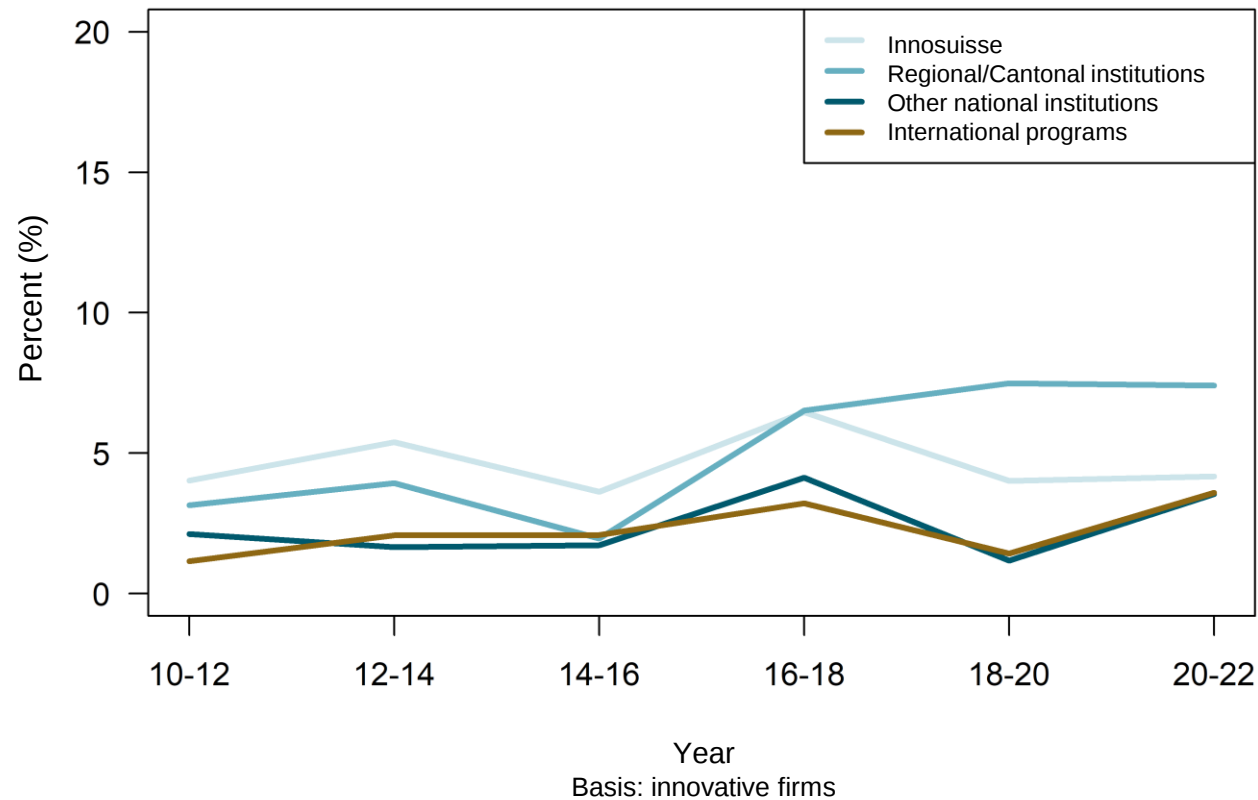
Innovation support from public institutions

(KOF innovation surveys)



- This figure shows the different types of innovation support Innosuisse applicants have profited from. Since not all Innosuisse applicants have received funding, the share for the support from Innosuisse is only at about 75%.
- Since we look at Innosuisse applicants, the support from other agencies is of course much lower.
- The share of Innosuisse applicants in all types of innovation funding decreases over time. This is in line with the general decline in binary innovation indicators. In other words, if there are fewer innovative firms, there is a high probability that interest in funding opportunities will also decline.
- In contrast to Innosuisse firms, the firms in the Swiss economy tended to show an upward trend in the 2023 survey period, following a slight decline in the previous 2021 survey period.
- In 2023, firms in the Swiss economy are most frequently supported by regional/cantonal institutions (7.4%), followed by Innosuisse (4.2%) (see KOF innovation survey 2023).

Innovation support from public institutions



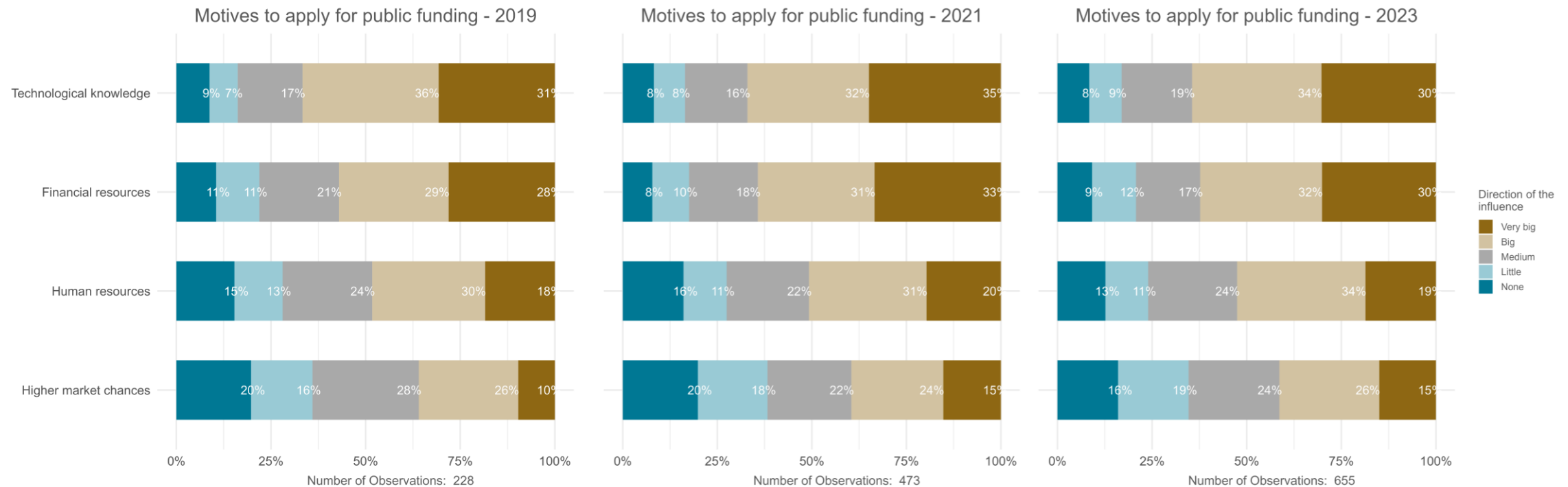
When looking at the share of firms that have received innovation support from Innosuisse in the overall economy, we see a relatively stable development over time. After a spike in 2016-2018, the share has been the same in the last two periods.

In contrast, the regional/cantonal innovation support has increased over time. Other national or international programs have seen a more stable development as well.

Motives to apply for public funding

(KOF innovation surveys)

Motives of Innosuisse firms to apply for public funding

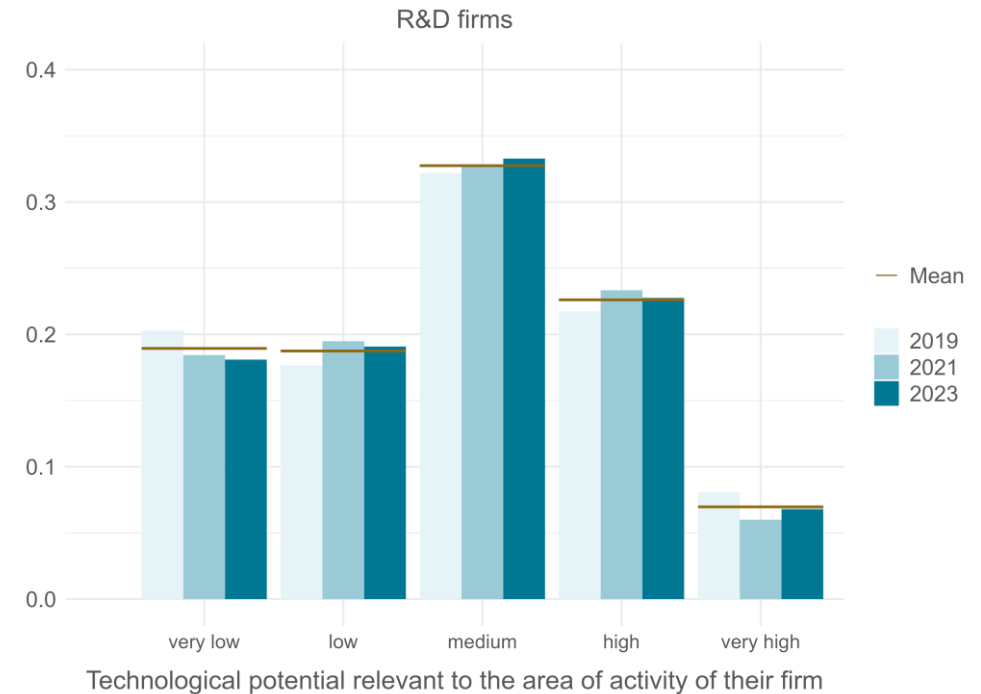
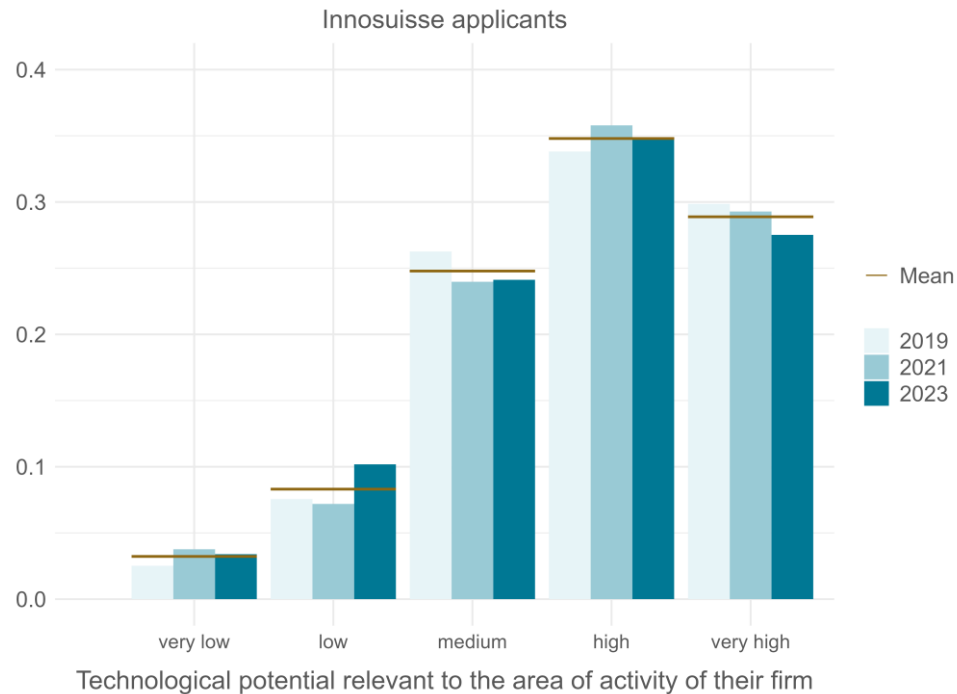


- The ranking of the motives for Innosuisse firms to apply for public funding of innovation activities has been stable over time.
- Most important is access to technological knowledge, followed closely by financial resources. This implies that the approach of Innosuisse to foster the transfer of know-how from universities to firms is on the right path. However, financial resources are of nearly equal importance as technological knowledge. Hence, the financial component of the innovation support is as relevant as technological knowledge.
- Human resources and higher market chances are also important, but a lot less than technological knowledge and financial resources.

Technological potential

(KOF innovation surveys)

Technological potential – all Innosuisse applicants/firms vs. R&D-active firms



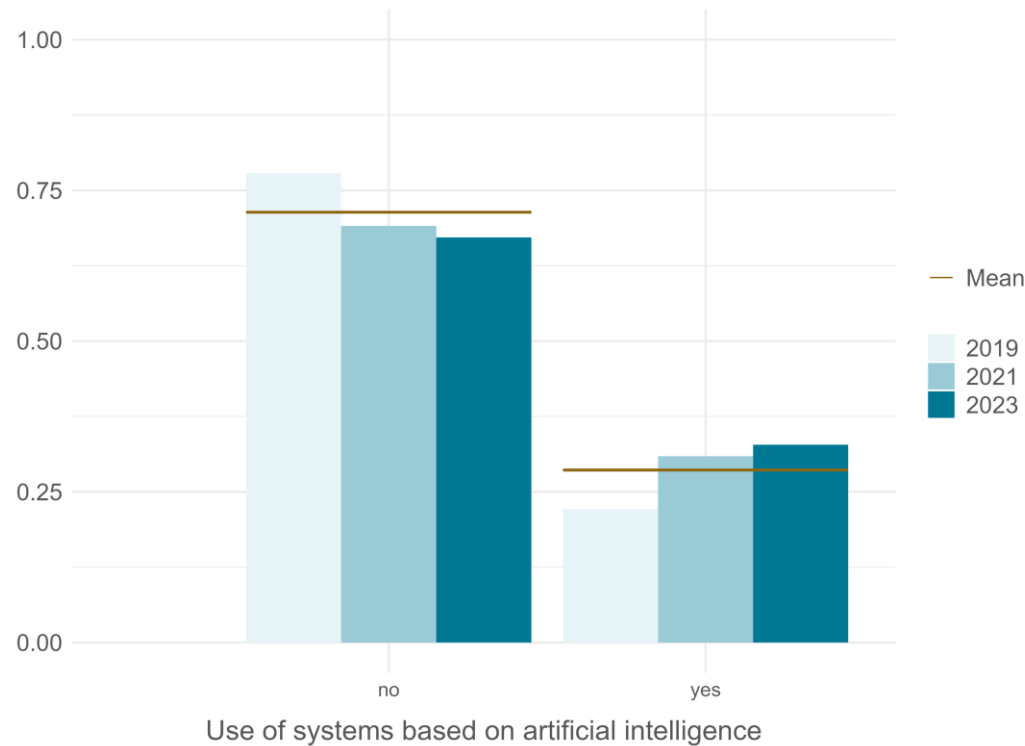
- Technological potential is defined by the privately and publicly available technological knowledge, which can be used for the creation of marketable innovations in their field of activity. It includes a) basic scientific knowledge and b) knowledge of key technologies (e.g. nanotechnology, semiconductor technology, biotechnology, computer science, audiovisual technologies, etc.) that are suitable for implementation of innovation.
- A high technological potential indicates a high relevance of university knowledge.
- 63.3% of Innosuisse applicants rate the technological potential that is relevant to their area of activity as (very) high in 2023.
- The fields in which Innosuisse firms are active show much higher technological potential than the ones in which R&D firms are active. This difference has been stable over time.

Artificial Intelligence

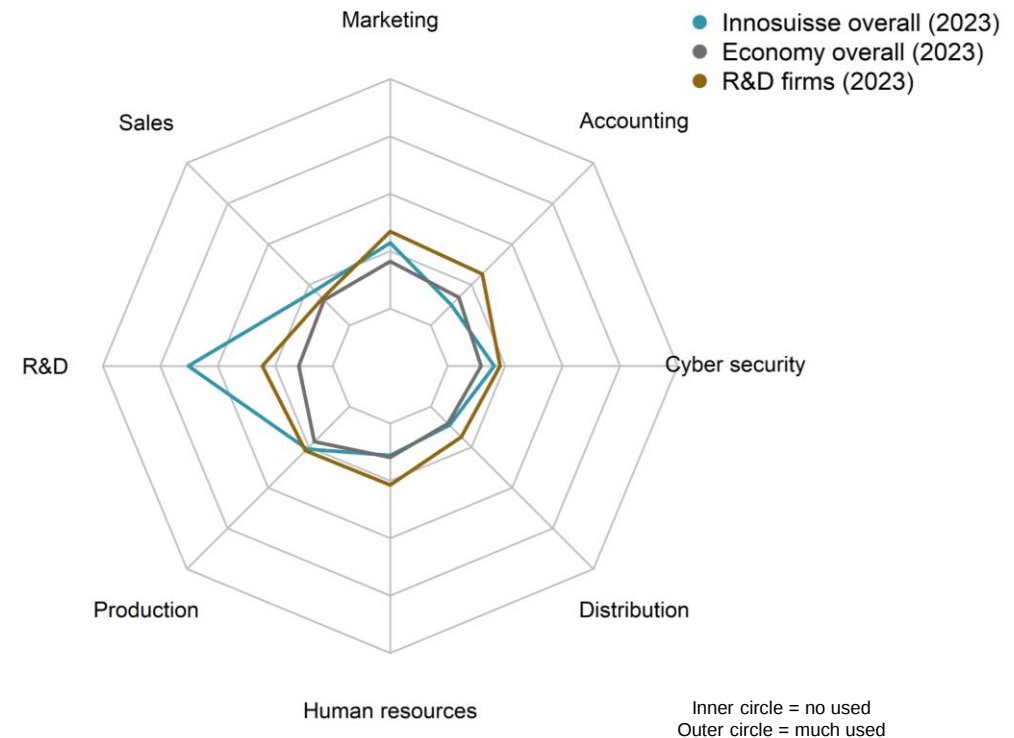
(KOF innovation surveys)



Use of artificial intelligence – all Innosuisse applicants/firms



Areas in which artificial intelligence are used



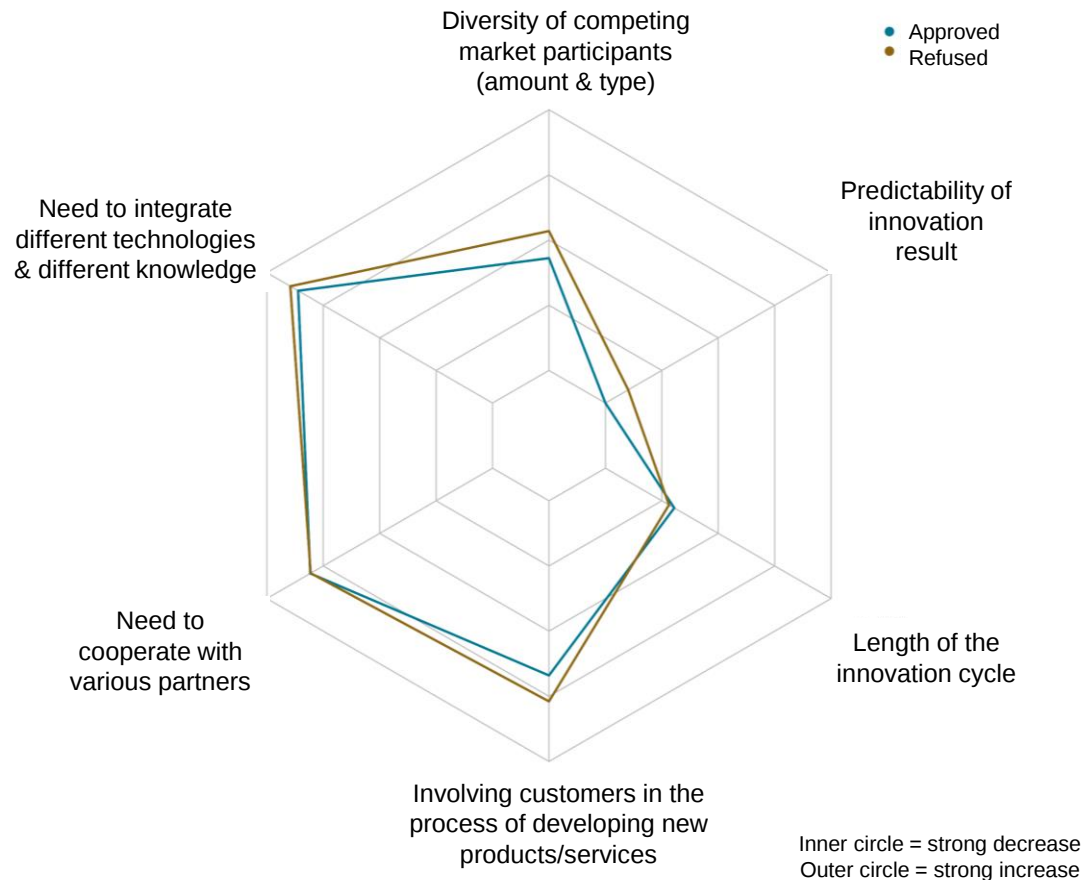
- Unsurprisingly, the usage of systems based on artificial intelligence has been increasing over the years for Innosuisse firms (22.1% in 2019, 30.9% in 2021 and 32.8% in 2023). Other firms reported a lower increase of usage (8.0% in 2019, 13.6% in 2021 and 13.3% in 2023). See Appendix page 66 for a comparison with R&D-active firms. The figures show that Innosuisse firms use AI more frequently than R&D-active firms.
- However, the intensity of the use of artificial intelligence in different areas is still low. This will likely increase in the years to come. Compared to other firms, Innosuisse firms use artificial intelligence much more frequently in R&D.

Complexity, megatrends & regulations, and digitalization

(Innosuisse survey 2023)

The innovation environment of Innosuisse firms becomes more complex

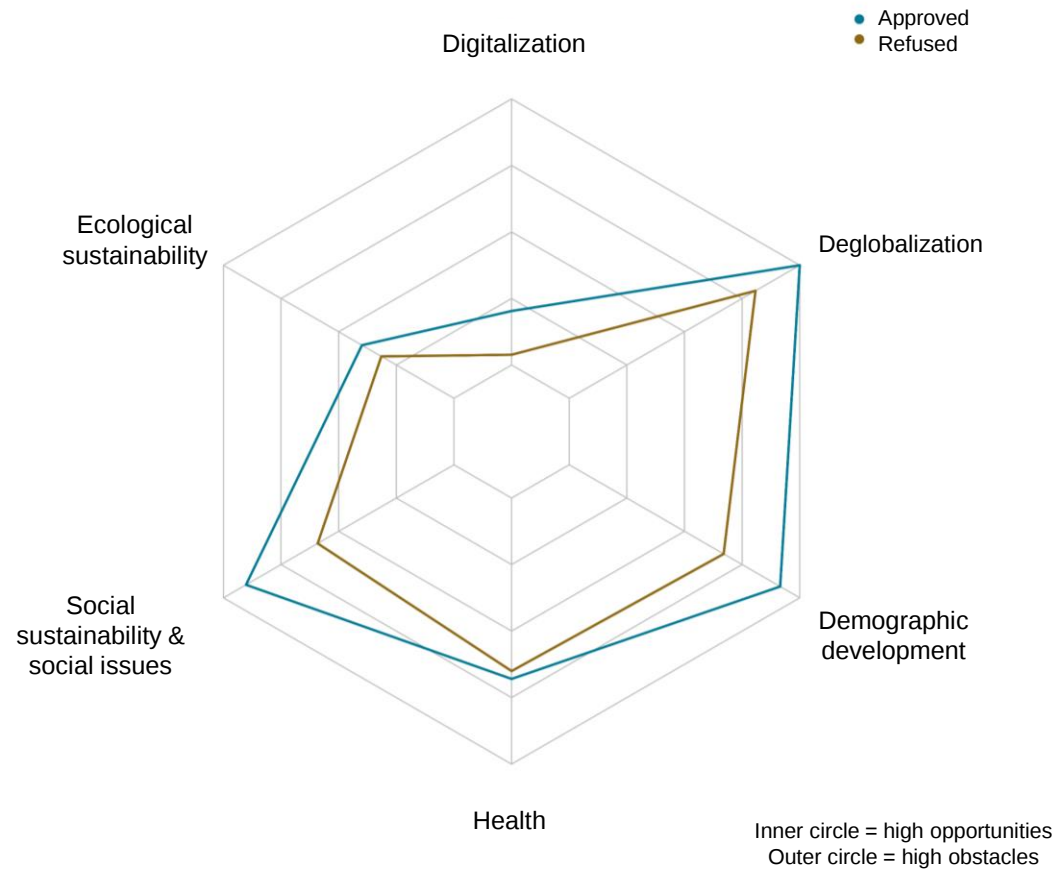
Complexity: Has the importance of the following factors for the innovation activities of Innosuisse applicants decreased or increased? Greater complexity is characterized by the increasing importance of a wide range of factors in a firm's innovation activities.



- The innovation activities of all applicants are subject to an increase in:
 - a) the need to integrate technologies and knowledge
 - b) the need of cooperation with various partners
 - c) the involvement of customers
- All applicants rate the more traditional indicators like diversity of competing market participants, predictability of innovation results, and the length of the innovation cycle as having been stable or even as having (strongly) decreased.
- The answers of applicants with approved projects do not differ from the answers of applicants with refused projects.
- In its funding activities, Innosuisse can address some of these factors, especially a), b), and c). These are also the factors that firms rate as having become more important. We can thus say that in general Innosuisse targets the right factors.
- The predictability of innovation result has decreased more for approved than for refused projects. This may be an indication that the low predictability of the results confirms that Innosuisse is funding projects that would otherwise probably not have been pursued.

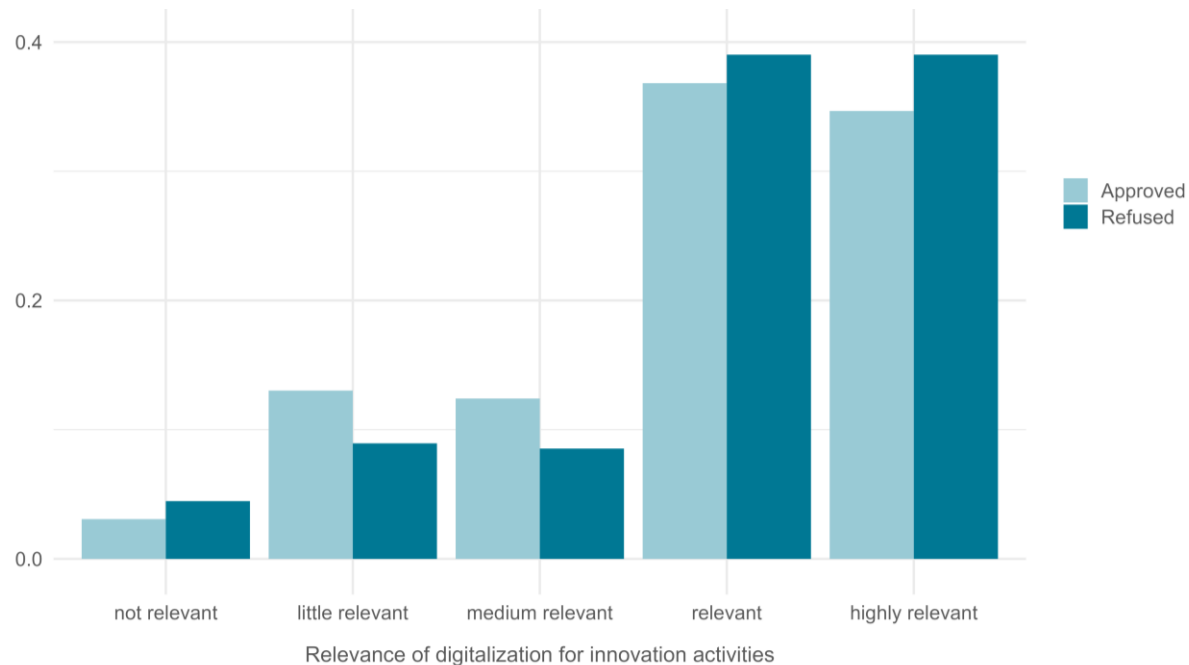
Influence of megatrends & regulations on the innovation environment of firms ^{KOF}

Megatrends & regulations: Were the following trends an obstacle or an opportunity for the Innosuisse applicants'/firms' innovation activities?



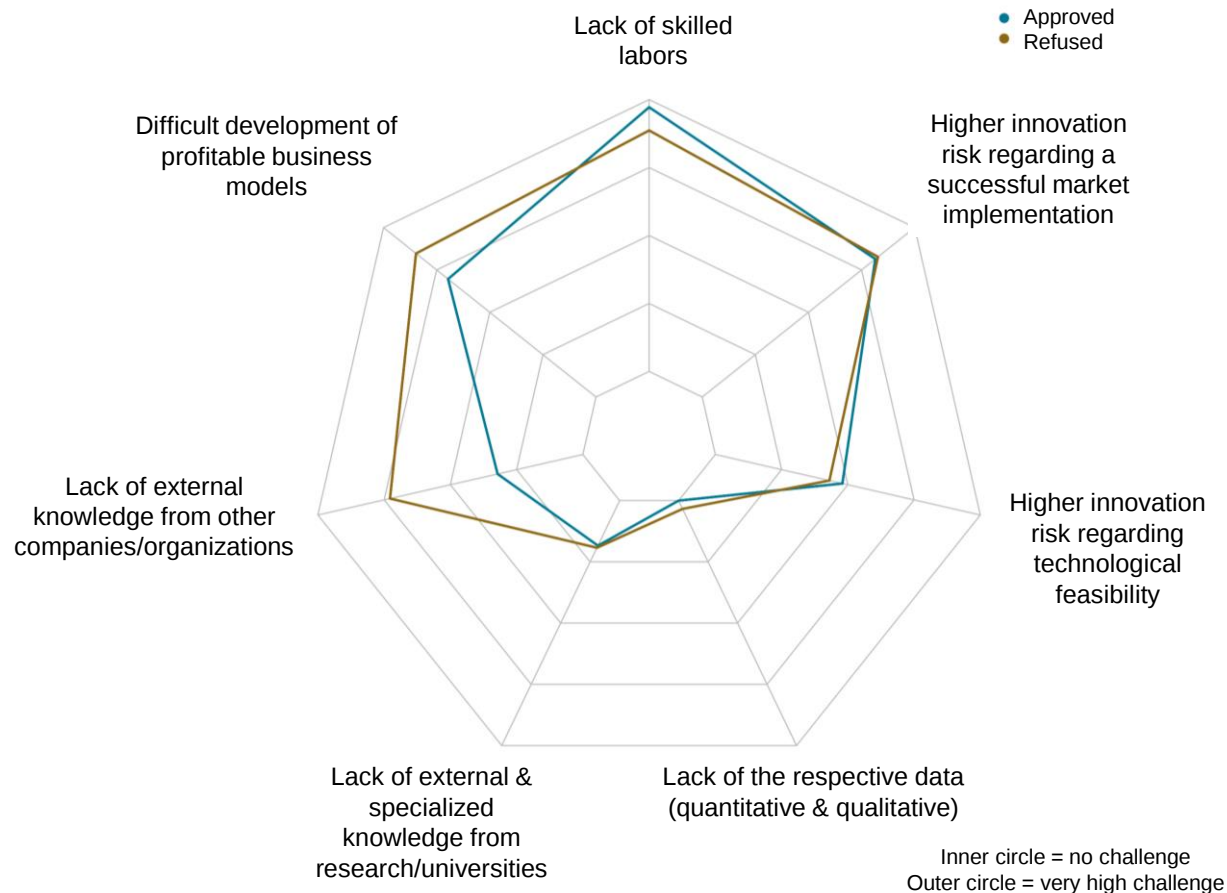
- Applicants rate digitalization as a large opportunity for their innovation activities. Ecological sustainability is rated as an opportunity rather than an obstacle as well.
- Applicants rate all other trends and regulations as obstacles and not as opportunities. Especially problematic for the innovation activities are deglobalization and demographic development. Health and social issues are somewhat less of an obstacle.
- Importantly, applicants with approved projects rate all trends and regulations as more of an obstacle than applicants with refused projects.
- The spider diagram thus provides an indication on the capability profile of the firms that submitted an application to Innosuisse. It suggests that Innosuisse has funded more firms that face challenges in deglobalization, demographic development, health, and social issues.
- In other words, Innosuisse is funding firms that face higher challenges and therefore also need the support.

Relevance of digitalization for innovation activities – all Innosuisse applicants/firms in 2023



- The majority of applicants rate digitalization as relevant (36.8 – 39.0%) or even highly relevant (34.7 – 39.0%) for their innovations activities.
- Firms with approved applications less frequently describe digitalization as relevant or highly relevant for their innovation activities. However, the differences are small.
- If the firms answered that digitalization is at least of medium relevance to their innovation activities, the spider diagram on the next page will display the detailed challenges they face.

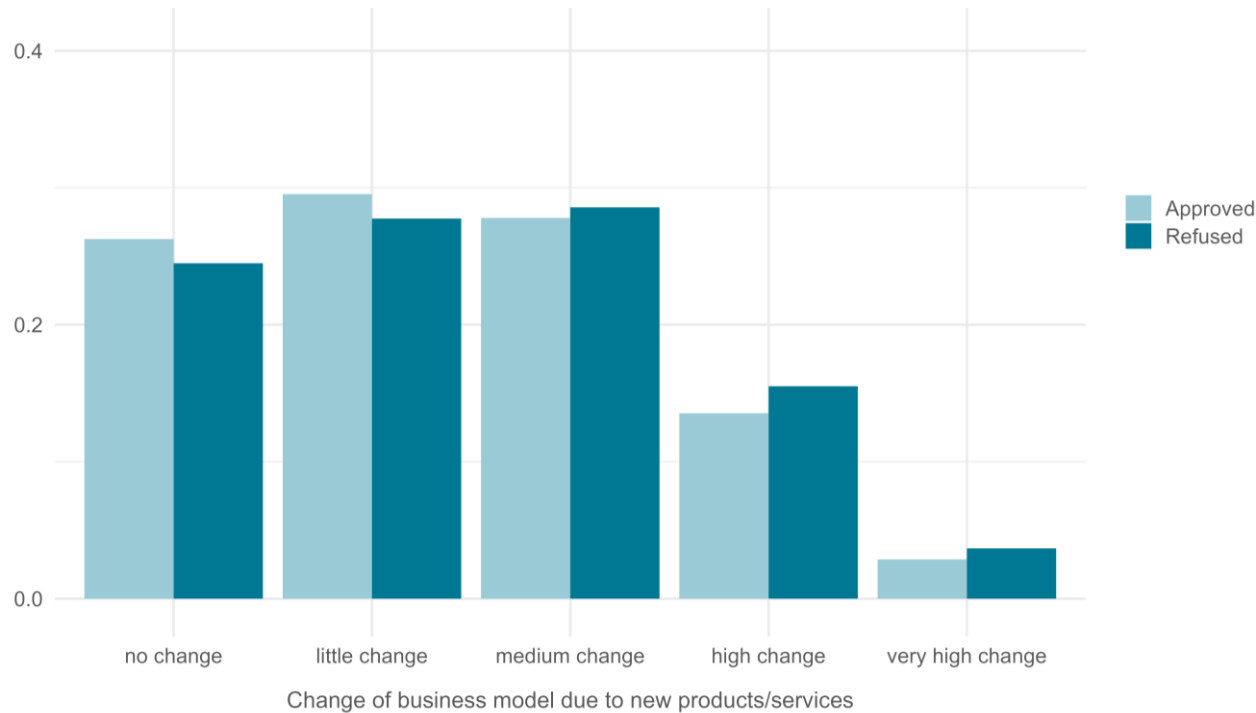
Which additional challenges result from the increased digitalization for the innovation activities of the applicants/firms?



The spider diagram depicts the challenge different factors represent for the innovation activities of firms due to the process of digitalization:

- a) Almost all applicants see the lack of skilled labors as a very high challenge. Firms lack skilled labor to deal with the abundance of data.
- b) Innovation risk of successful market implementation and difficulty of development of profitable business models are also high challenges. This stands in contrast to technological feasibility, which is a lower challenge.
- c) Lack of external and specialized knowledge from research/universities provides a small challenge. This suggests that the transfer of knowledge from universities is doing little to address the challenges of digitalization for innovation. However, for approved projects, external knowledge from other companies/organization is much lower. Since companies often cooperate in Innosuisse projects, this might suggest an effect of the funding.
- d) The lack of data does not implicate any challenge. This could be related to the lack of qualified employees, as a lack of data only manifests itself if the firm has the skills to analyze this data in a meaningful way.

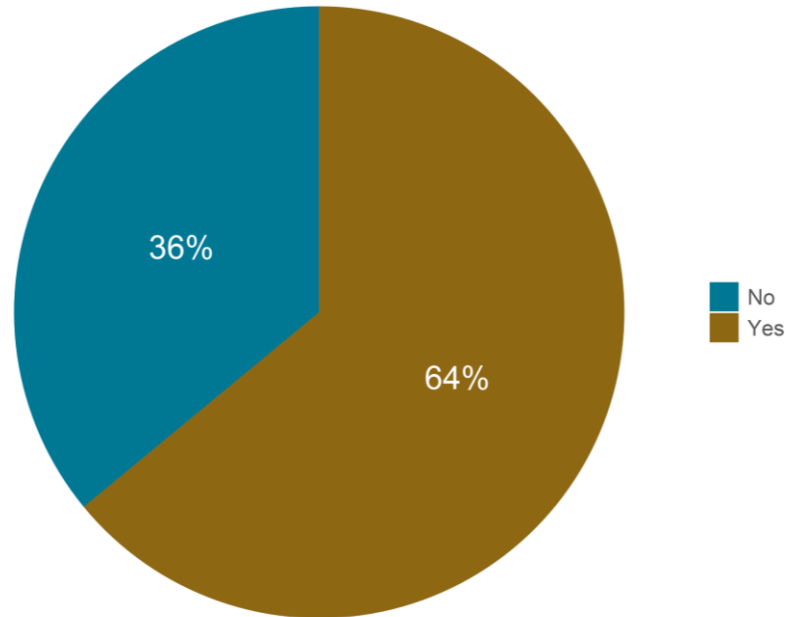
Change of business model due to new products/services – all Innosuisse applicants/firms in 2023



- The majority of firms report that the development of new products or services has caused no or only small changes to their business model.
- 28-29% of firms report that it has caused medium changes.
- Relatively few firms report that the development of new products or services has caused high changes (14-16%) or even very high changes (3-4%) to their business model.
- These numbers do not differ much between refused and approved projects.
- The graph suggests that innovation activities lean towards the existing business models.

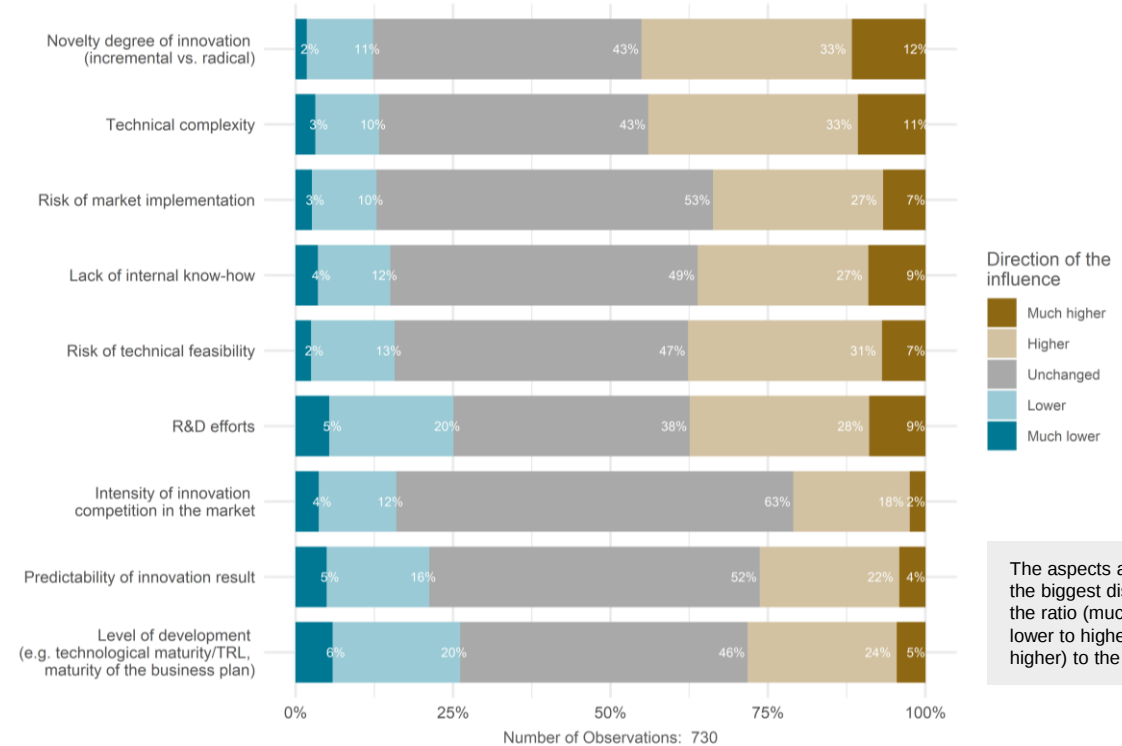
Comparison of Innosuisse projects with other innovation projects (1/2) ^{KOF}

Does your firm pursue other, unfunded innovation projects in addition to the innovation project(s) submitted to Innosuisse?



36% of applicants have no other innovation projects. In contrast, 64% of Innosuisse applicants responded that they were pursuing other innovation projects besides the projects submitted to Innosuisse. The figure on the right shows results for this subset of firms.

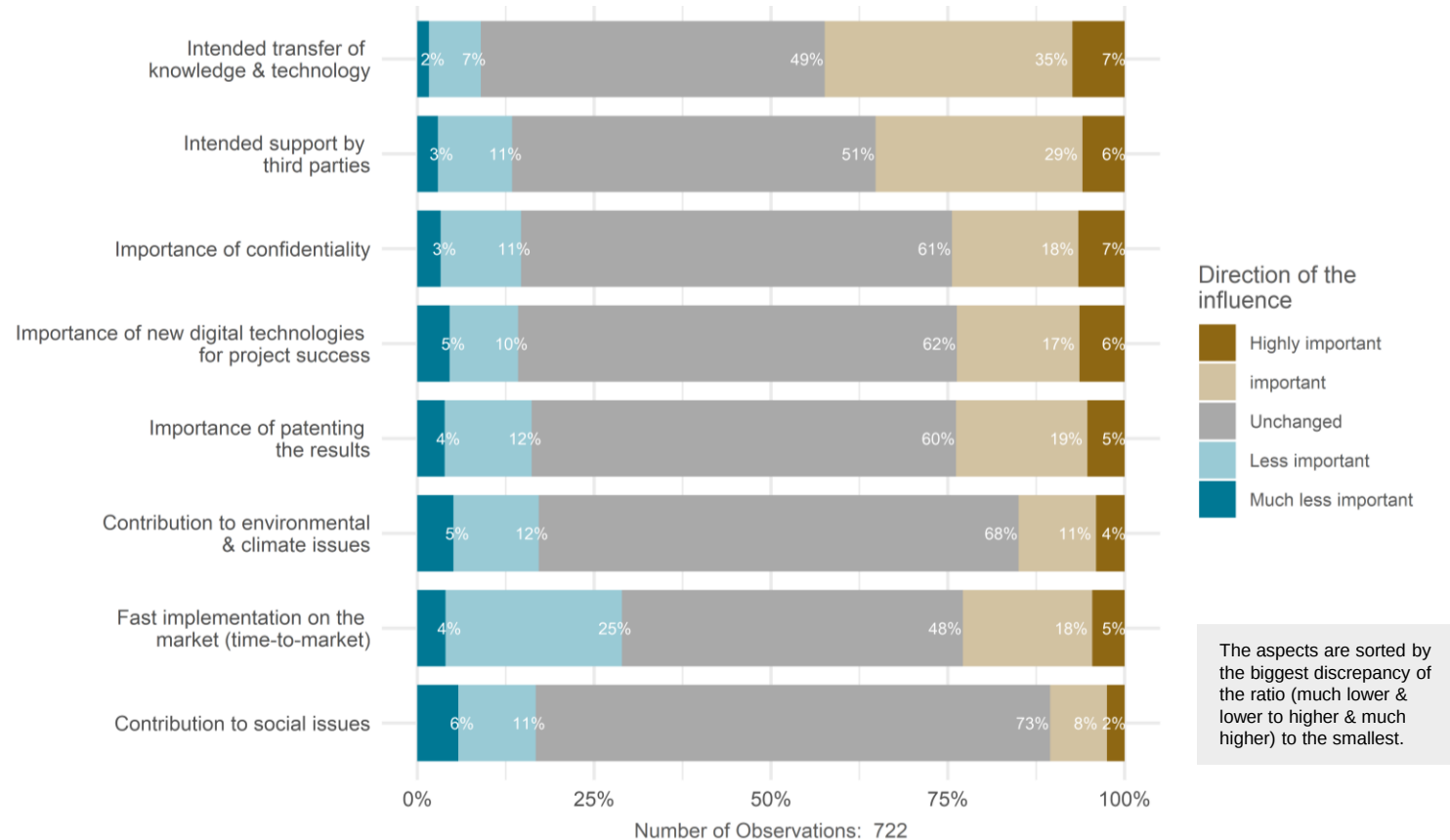
Aspects by which the Innosuisse projects differ from the other innovation projects of the firm:



Firms which also pursue other projects (64%) responded as depicted above. The most common response is «unchanged». Hence, in general, other innovation projects do not differ too much from the innovation projects submitted to Innosuisse. However, when looking closer, most aspects are rated as somewhat higher for Innosuisse projects than for other innovation projects. Especially the novelty degree of the innovation, the technical complexity, and the lack of internal know-how are rated as higher on average.

Comparison of Innosuisse projects with other innovation projects (2/2) ^{KOF}

Aspects by which the Innosuisse projects differ from the other innovation projects of the firm:

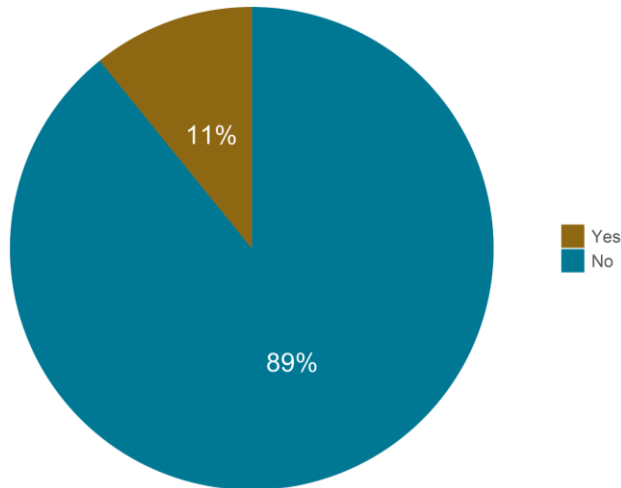


- Again, the importance of the displayed aspects does not differ too much between the innovation projects submitted to Innosuisse and other innovation projects. For all aspects, «unchanged» is the most common category. Only «intended transfer of knowledge and technology» and «intended support by third parties» are decidedly more important for the Innosuisse projects. All other aspects show more symmetric distributions.
- Hence, Innosuisse attracts projects that have the following characteristics: they intend to use the transfer of knowledge and technology and they intend to utilize the support provided by third parties.
- The absence of a difference in the importance of confidentiality suggests that Innosuisse is a trusted institution among the applicants.

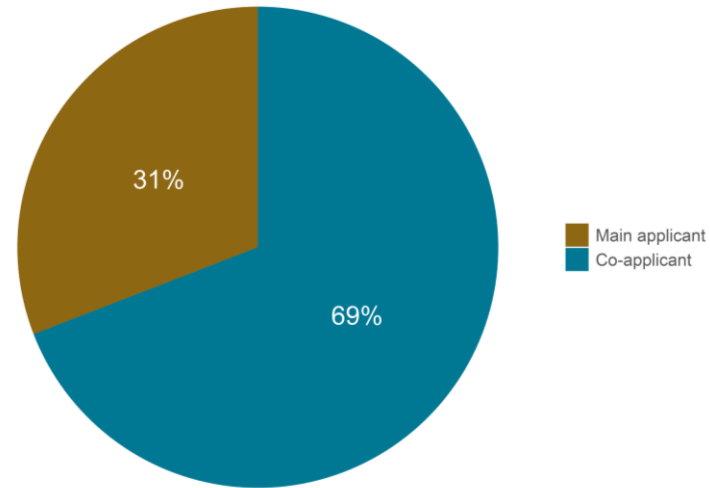
Horizon Europe

(KOF innovation survey 2023)

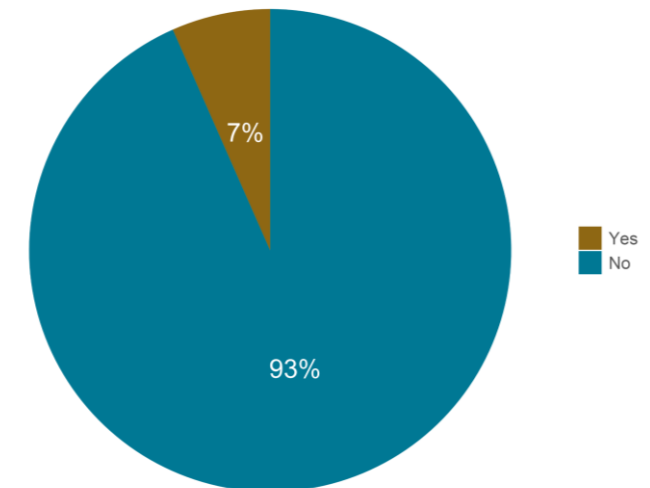
Has your firm submitted an application for Horizon Europe in the period of 2021-2022?



Have you submitted an application for Horizon Europe as a main or co-applicant?

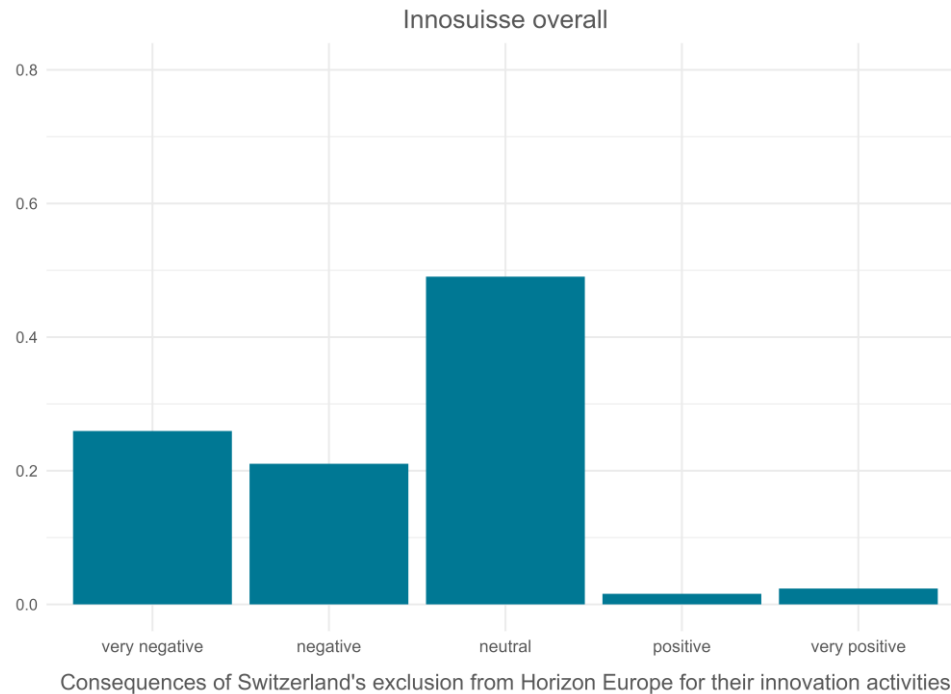


Was your project application for Horizon Europe successful?

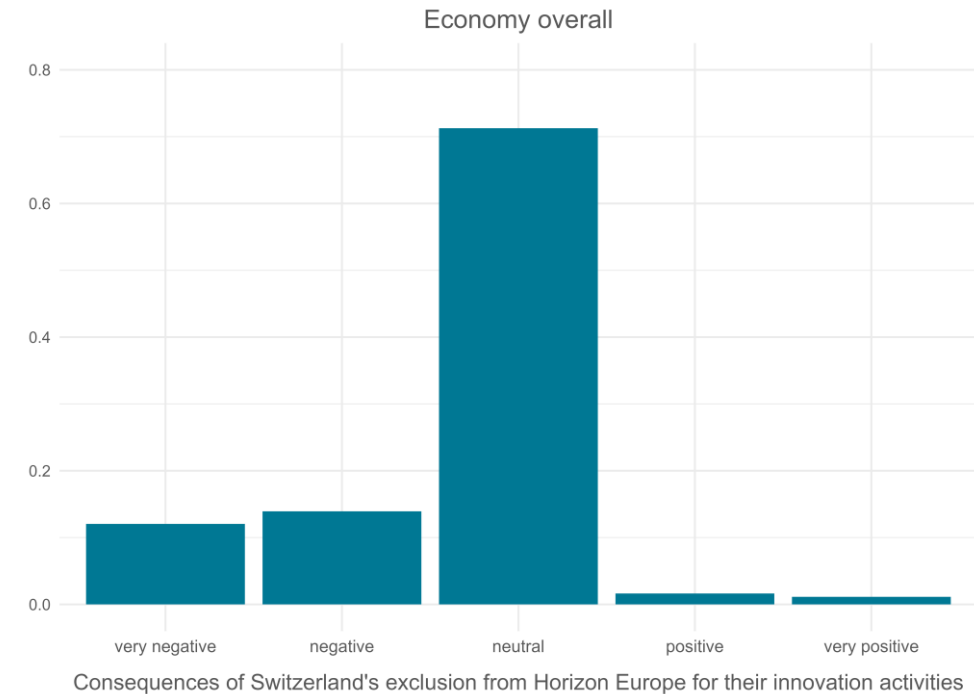


- 11% (72 firms) of the Innosuisse firms have submitted an application for Horizon Europe in the period of 2021-2022, of which 31% were main applicants and 69% were co-applicants.
- 7% (44 firms) who have submitted an application for Horizon Europe were successful in receiving Horizon Europe funding.

How firms assess the consequences of Switzerland's exclusion from Horizon Europe for their innovation activities?

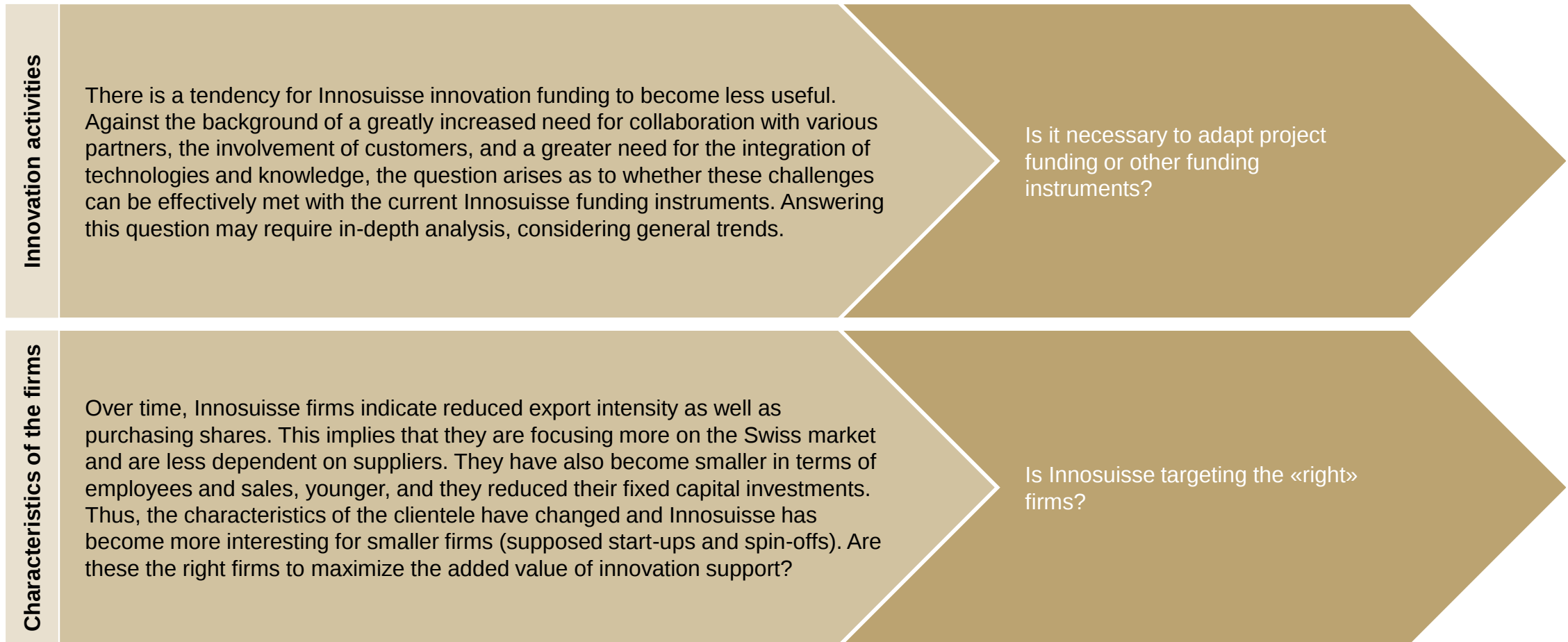


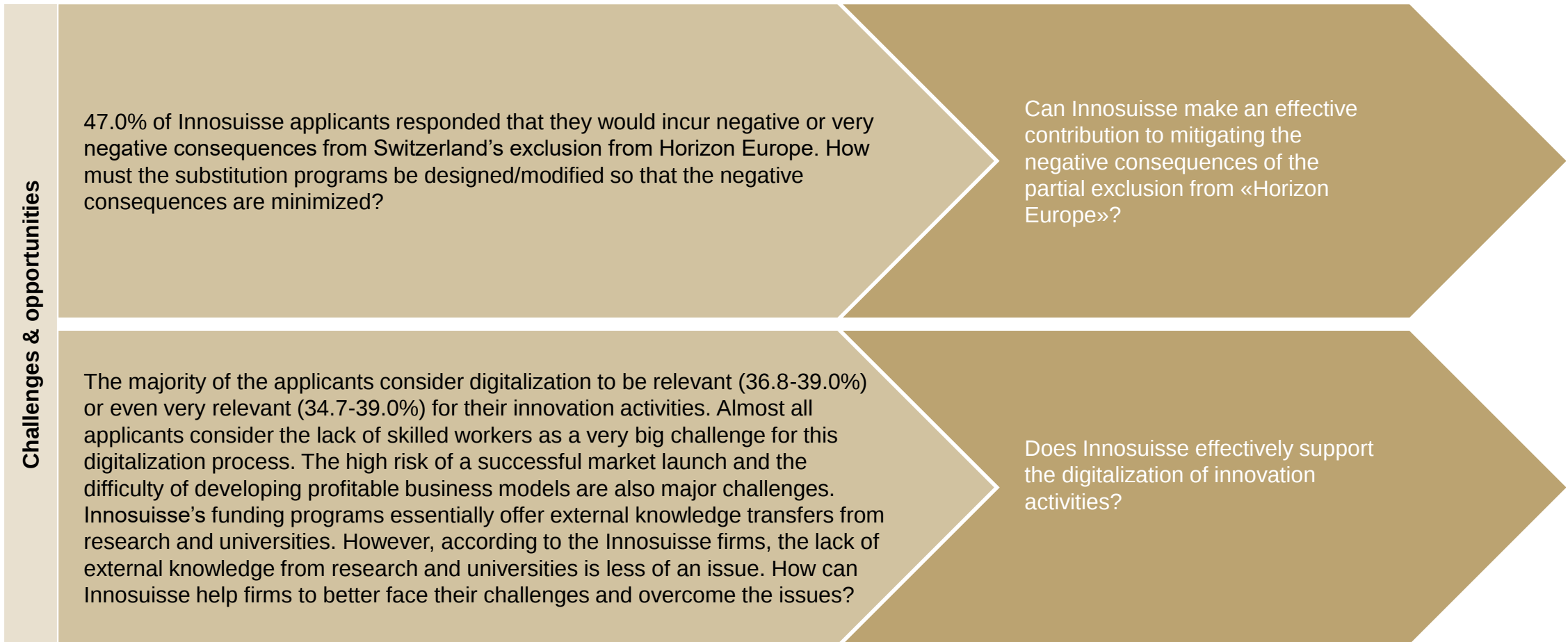
- 47.0% of Innosuisse applicants responded that they will incur negative or very negative consequences from Switzerland's exclusion from Horizon Europe.
- 49.1% say that they have no special consequences.
- Very few firms reported that the exclusion from Horizon Europe will be positive or very positive.



- 71.3% of the overall economy state that they have no special consequences.
- 25.9% report (very) negative consequences from Switzerland's exclusion from Horizon Europe.
- Hence, a similar pattern for the overall economy can be observed. However, firms of the overall economy are less negatively affected by Switzerland's exclusion from Horizon Europe.

Discussion of the results & outlook





Trends

Similar to the economy as a whole, the share of Innosuisse companies that perform R&D, have created a new product/service or process innovation has declined. At the same time, innovation expenditure has increased, and the commercial success of innovative products has remained constant. This means that fewer companies are investing more, thereby keeping the average turnover with innovative products constant. Observations also show that the market implementation risks of R&D activities are rated higher than the technical risks. Such trends do not only indicate that innovation models have changed but may also pose a challenge to the design of the current Innosuisse support, in particular for SMEs.

The bigger picture: What dynamics could be important for the design of the Innosuisse support?

ETH Zürich
KOF Konjunkturforschungsstelle

Leonhardstrasse 21
8092 Zürich
www.kof.ethz.ch



Appendix



Structure of the Innosuisse survey 2023

The Innosuisse survey is divided into three parts:

- The 1st part comprises questions with regard to the firm's innovation and F&E activities.
- The 2nd part covers questions with respect to their innovation environment (e.g. competitors, technological knowledge, cooperation with partners, results of the innovation etc.), market trends and regulations (digitalization, ecological sustainability, social issues, etc.) as well as challenges related to digitalization.
- The 3rd part contains questions concerning how projects submitted to Innosuisse differ from other innovation projects of their firm.

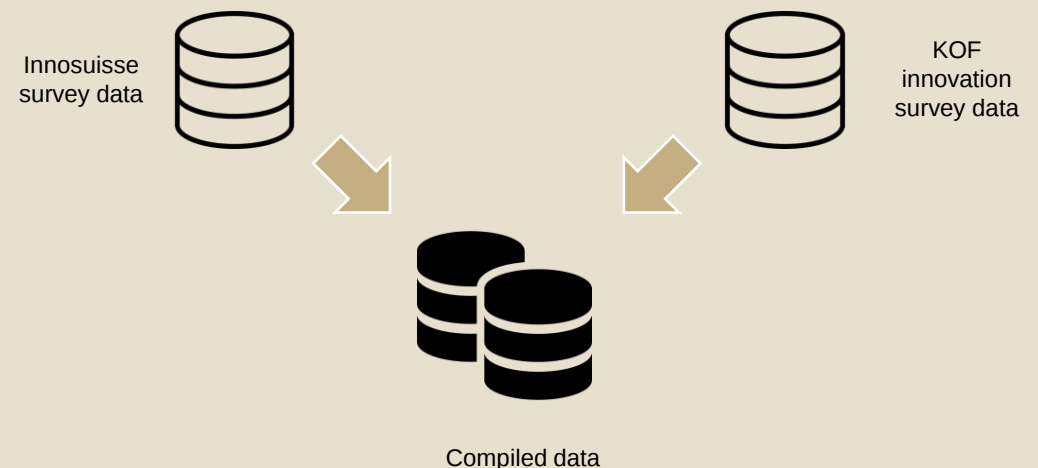
Structure of the KOF innovation survey

The KOF innovation survey is not discussed in detail as the underlying report sheds light on the Innosuisse survey. However, there is a separated report series which analyze the data from the KOF Innovation survey.

For further details, see <https://kof.ethz.ch/umfragen/strukturumfragen/kof-innovationsumfrage.html>

Composition of the data set used in the report

The whole data set consists of data from the Innosuisse survey and data of the KOF innovation survey from 2019, 2021 and 2023. This report is mainly based on the data from the Innosuisse surveys. The data from the KOF innovation surveys are only used in order to compare the Innosuisse firms to the firms of the overall economy in Switzerland.



Data used from Innosuisse surveys

Term	Definition
Innosuisse applicant/firm	All firms which have answered the Innosuisse survey regardless of their funding status and national or domestic projects. They may be firms having applied for funding or already having been funded by Innosuisse.
Project support	- Project support (“Projektförderung”) is a type of funding program offered by Innosuisse. The budget is about 100'000 to 500'000 per project. - Project support includes both national and international project support.
Innovation check	Innovation check (“Innovationsscheck”) is a type of funding program offered by Innosuisse. Firms may apply for an innovation check to fund small innovation projects. The budget is 15'000 per project.
Domestic project support	- Firms can apply for domestic project support, meaning they cooperate with national partners for their innovation projects. - The majority of firms apply for domestic project support.
International project support	- Firms can apply for an international project support, meaning they cooperate with international partners for their innovation projects. - Only a minority of firms apply for international project support.
Approved	It contains all approved projects (project support and/or innovation check) funded by Innosuisse.
Refused	It contains all refused projects (project support and/or innovation check) as well as projects that have no yet been approved or refused.

Data used from KOF Innovation surveys

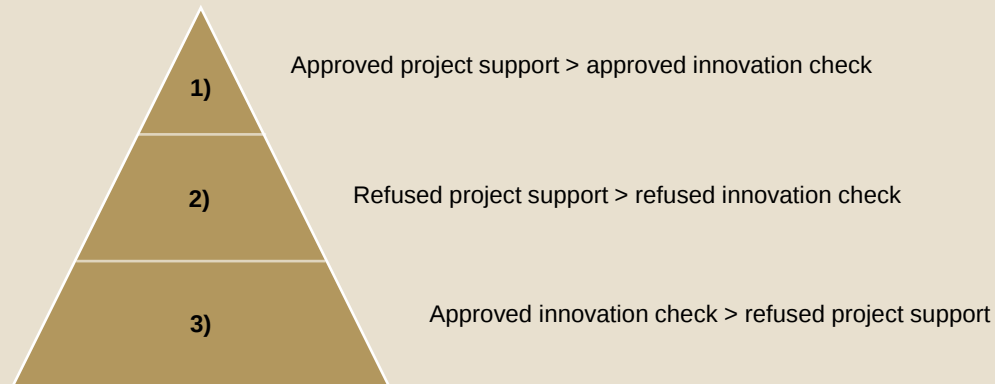
Term	Definition
Economy (firm) overall	All firms which have answered the KOF innovation survey regardless whether they have answered the Innosuisse survey or not.
R&D (active) firm	All firms which have answered the KOF innovation survey and have R&D activities.
High-tech firms	All firms which have answered the KOF innovation survey regardless whether they have answered the Innosuisse survey and are categorized as high-tech firms based on the General Classification of Economic Activities NOGA 2008. Firms in the following industries are regarded as high-tech firms: - Chemicals - Pharmaceuticals - Machinery & equipment - Electrical equipment - Electronic and optical products - Medical instruments - Watches/clocks - Vehicles

The following rules were implemented in data modelling.

Multiple projects

There may be firms that have submitted more than one application for project support or innovation checks. If so, the following rule was used to analyze the data:

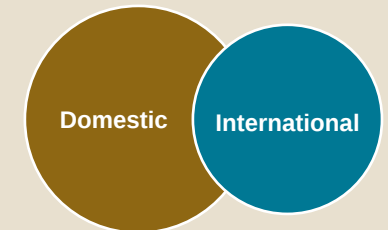
- 1) Approved innovation projects overrule approved innovation checks
- 2) Refused innovation projects overrule refused innovation checks
- 3) Approved innovation checks overrule refused innovation projects



Domestic and international projects

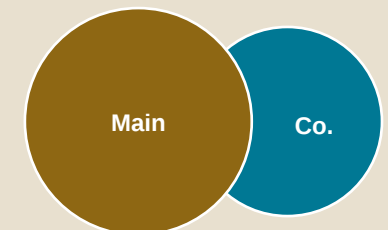
Firms may apply for domestic, international or for both, domestic and international projects.

- Domestic set: only domestic projects were considered, firms with both domestic and international were excluded from this set.
- International set: all international projects were included regardless whether they have also applied for domestic projects due to the small sample size ($n < 50$).

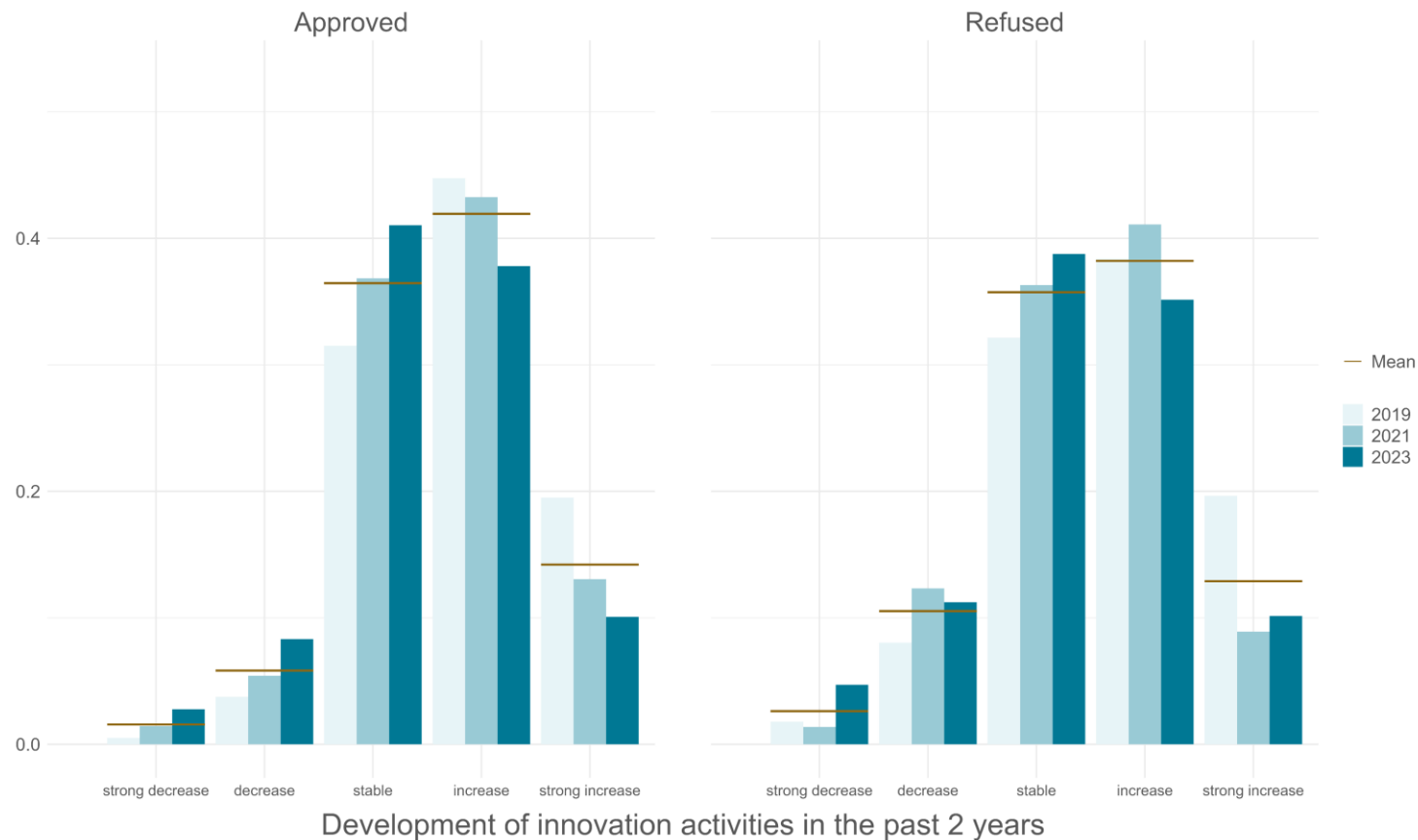


Horizon Europe applicants

Firm who have applied for Horizon Europe funding may apply as main applicant or co-applicant or both. If a firm has applied as both, main and co-applicant, they have been handled as main applicant.

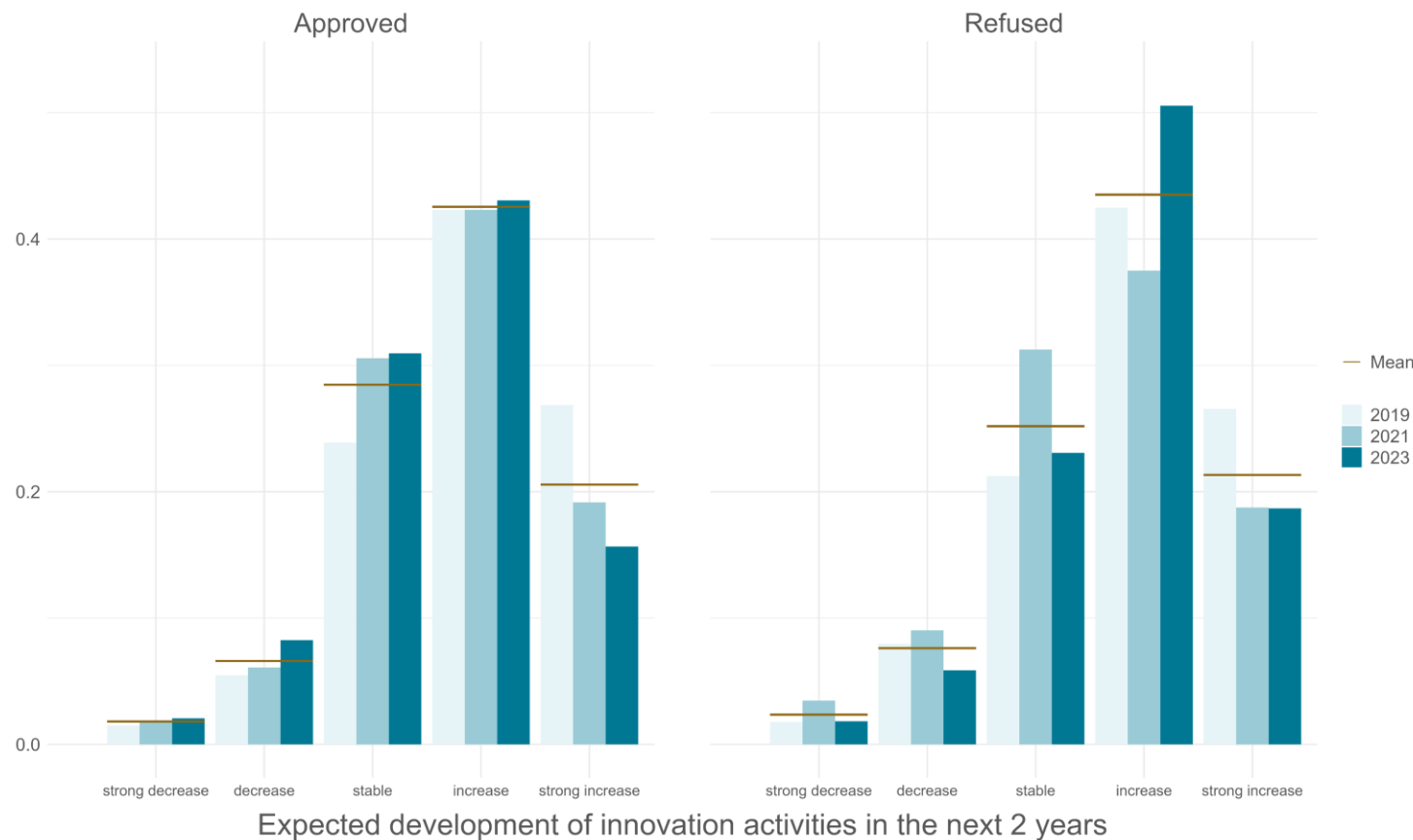


Estimated development of innovation activities in the past 2 years – approved vs. refused projects



The estimated development of past innovation activities shows for refused and approved projects a similar pattern as we saw with the overall pattern.

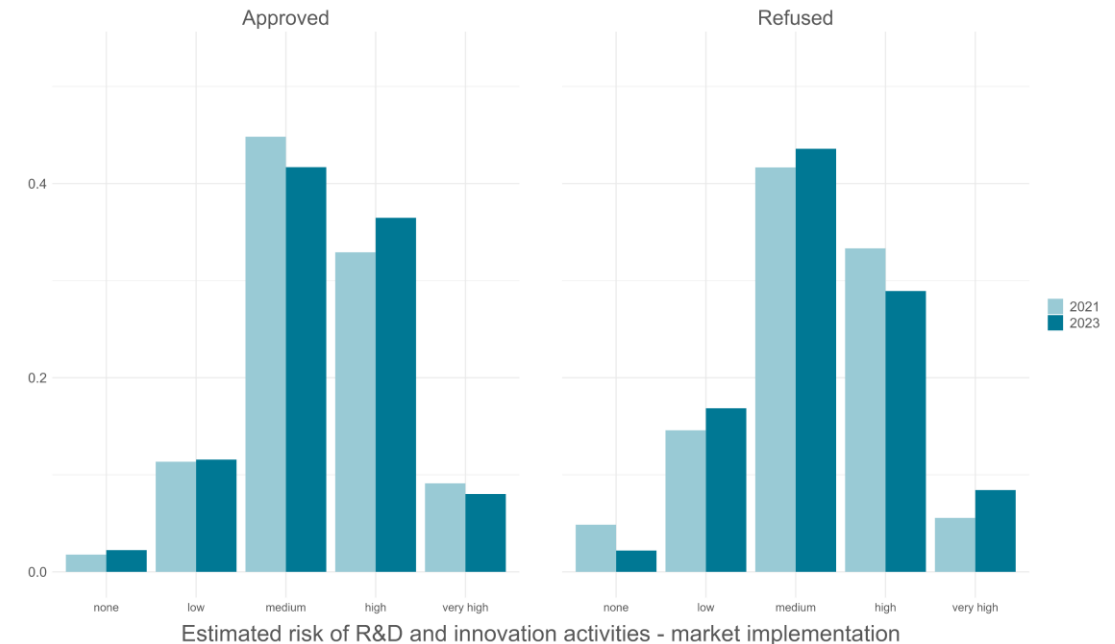
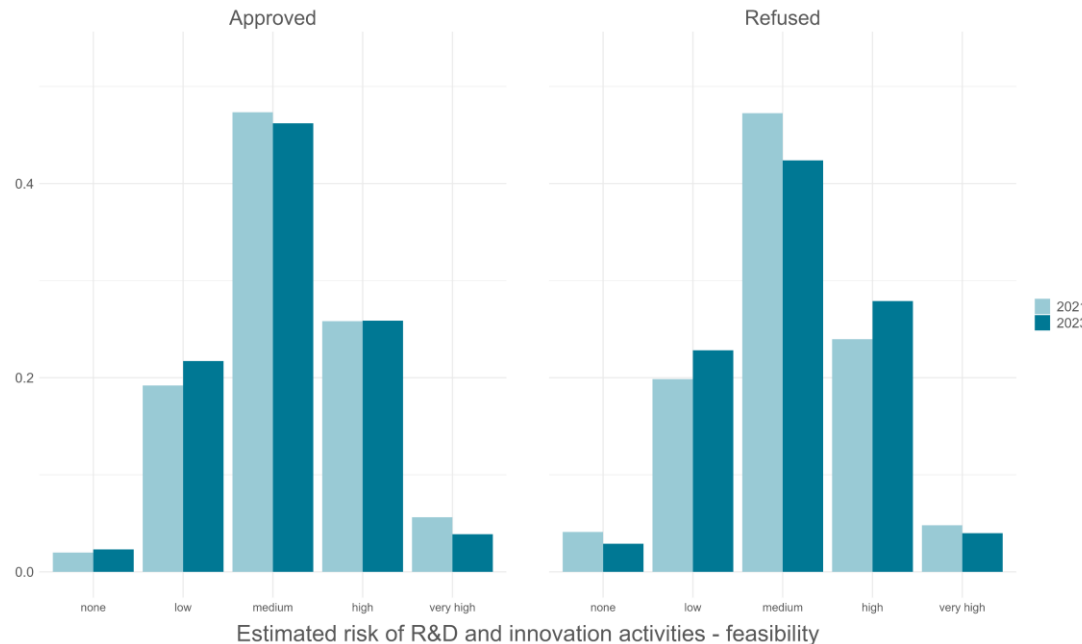
Estimated development of innovation activities in the next 2 years – approved vs. refused projects



The estimated development of innovation activities in the future shows some differences for approved and refused projects. The refused projects show a much higher volatility over the years, in particular a strong increase from «stable» to «increase» from 2021 to 2023. The expected development of the innovation activities of the approved projects remain more stable. Moreover, and in contrast to the approved projects, the category «decrease» went down for the refused projects.

Estimated risk of R&D and innovation activities (feasibility and market implementation)

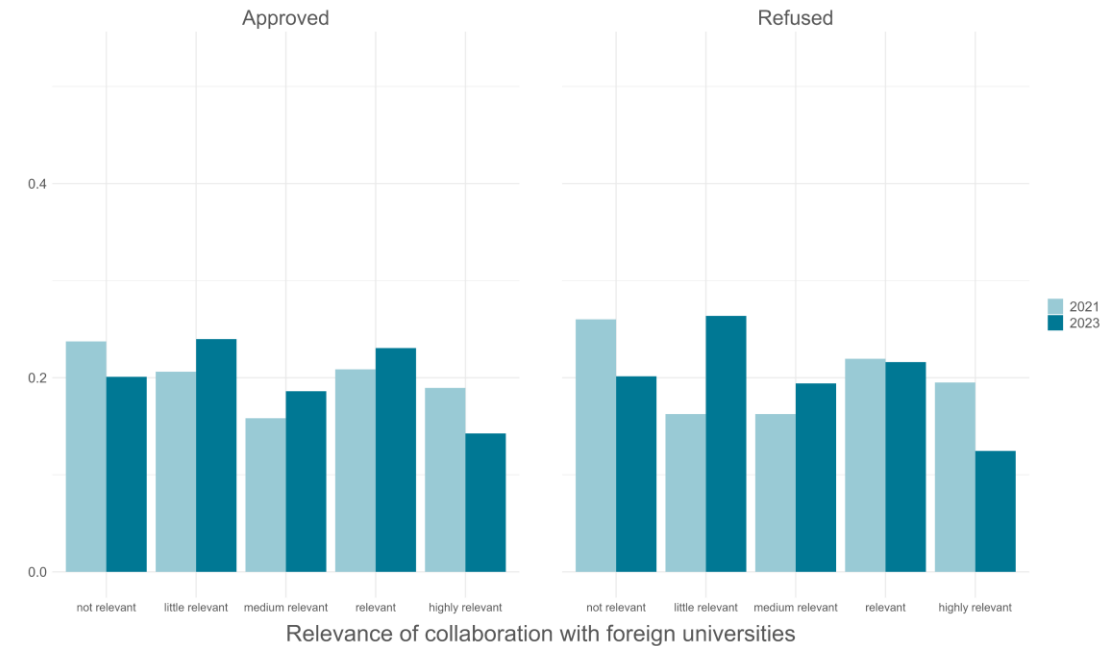
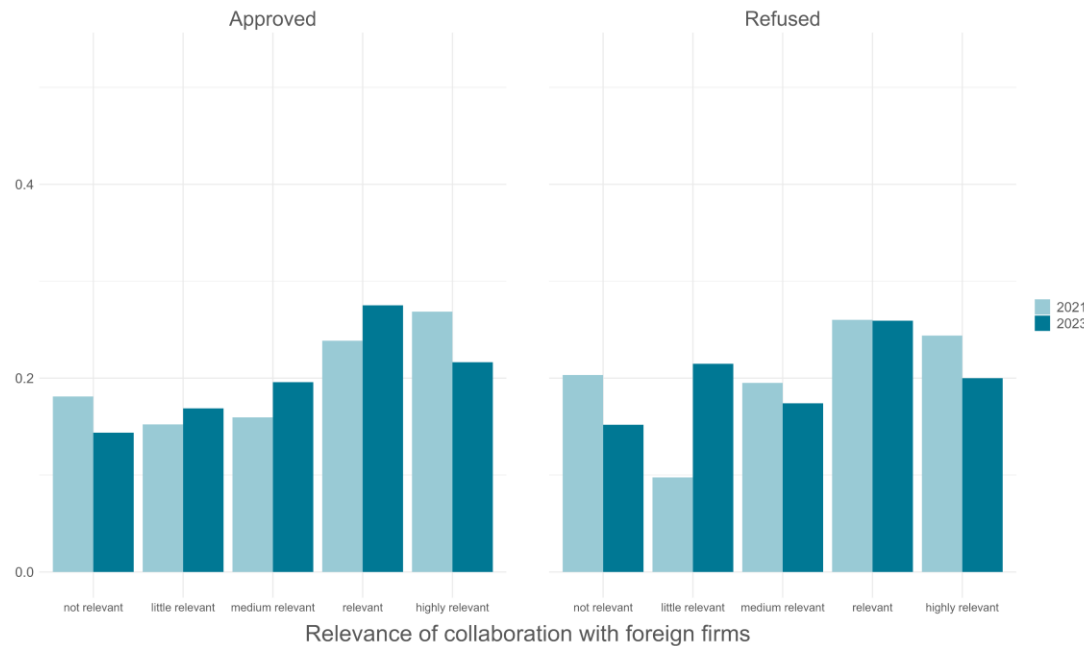
Estimated risk of R&D and innovation activities in terms of feasibility and market implementation – approved vs. refused projects



- For the estimated risk of R&D and innovation activities in terms of feasibility, we observe similar patterns for approved and refused projects. However, there is a shift from «medium» to «high» in the «refused» category.
- Approved projects indicate a slightly more stable development between 2021 and 2023.

- For the estimated risk of R&D and innovation activities in terms of market implementation, we observe once again similar patterns for approved and refused projects. However, there is a slight shift from «high» to «very high».
- We also see that for approved projects the category «high» is larger than for refused projects, while the category «low» is smaller.

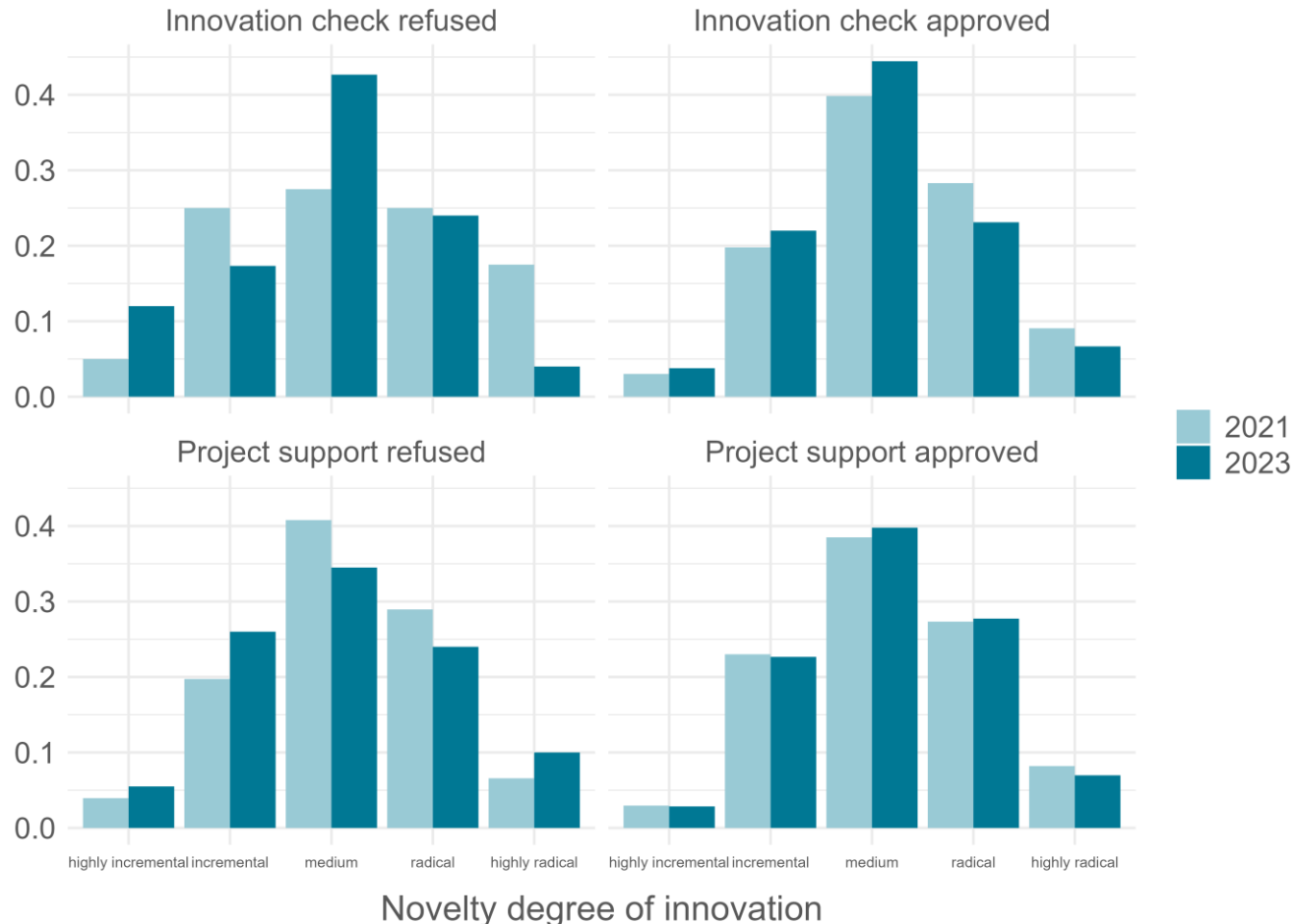
Relevance of collaborations with foreign firms and universities – approved vs. refused projects



- The relevance of collaborations with foreign firms shows only few systematic differences between approved and refused projects.
- What stands out is the sharp rise in the «little relevant» category for firms with refused projects.

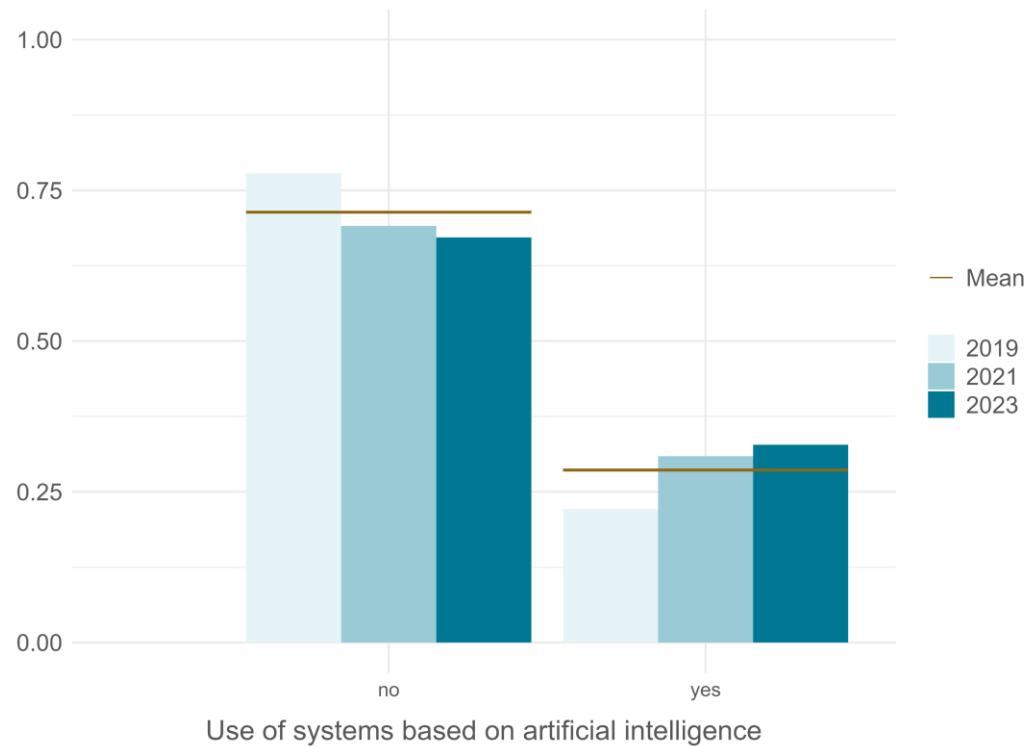
- Similarly, the relevance of collaborations with foreign universities shows few systematic differences as well between firms with approved and refused projects.
- There is again an important difference in the category «little relevant».

Novelty degree of innovations – refused vs. approved projects & innovation support vs. innovation check

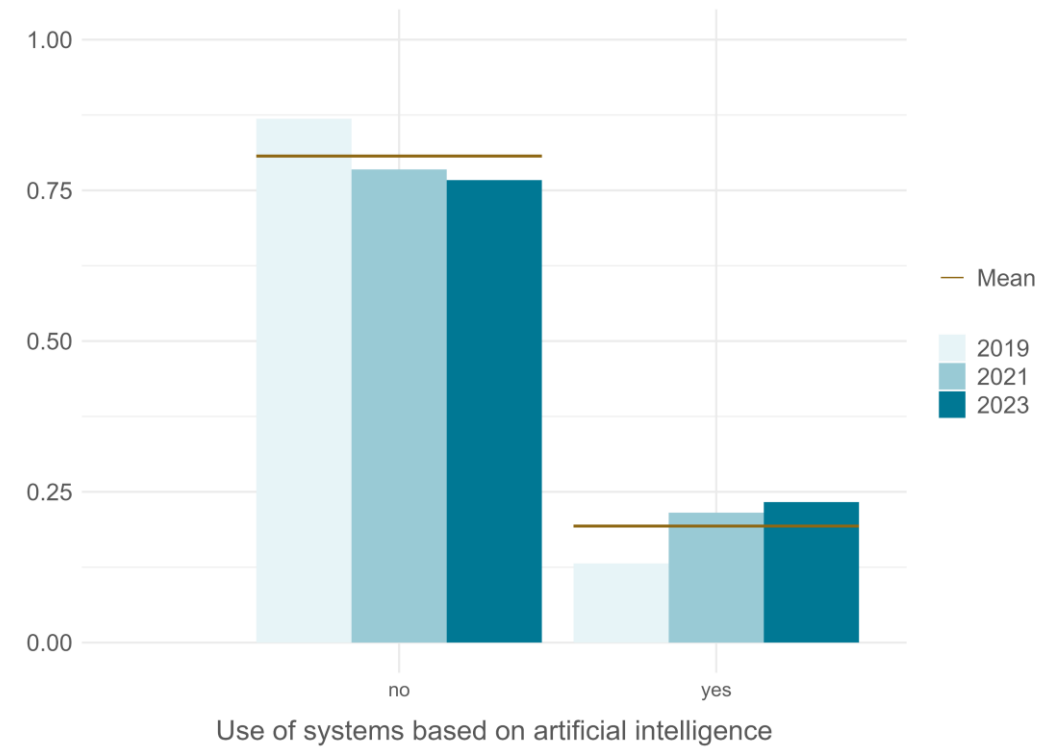


- Firms with approved innovation checks and approved projects indicate a higher degree of novelty than firms with refused innovation checks and refused projects. This indicates that Innosuisse is supporting the projects of those firms that show a higher degree of novelty. However, the difference between these categories is small.
- Over time, it is noticeable that the category of refused innovation checks shows a clear tendency towards a medium degree of novelty, while the categories of approved innovation checks and both types of projects have been more stable.

Use of artificial intelligence – all Innosuisse applicants



Use of artificial intelligence – R&D-active firms



The figures show that Innosuisse and R&D-active firms have a similar pattern in the usage of artificial intelligence. However, AI is more frequently used by Innosuisse firms.