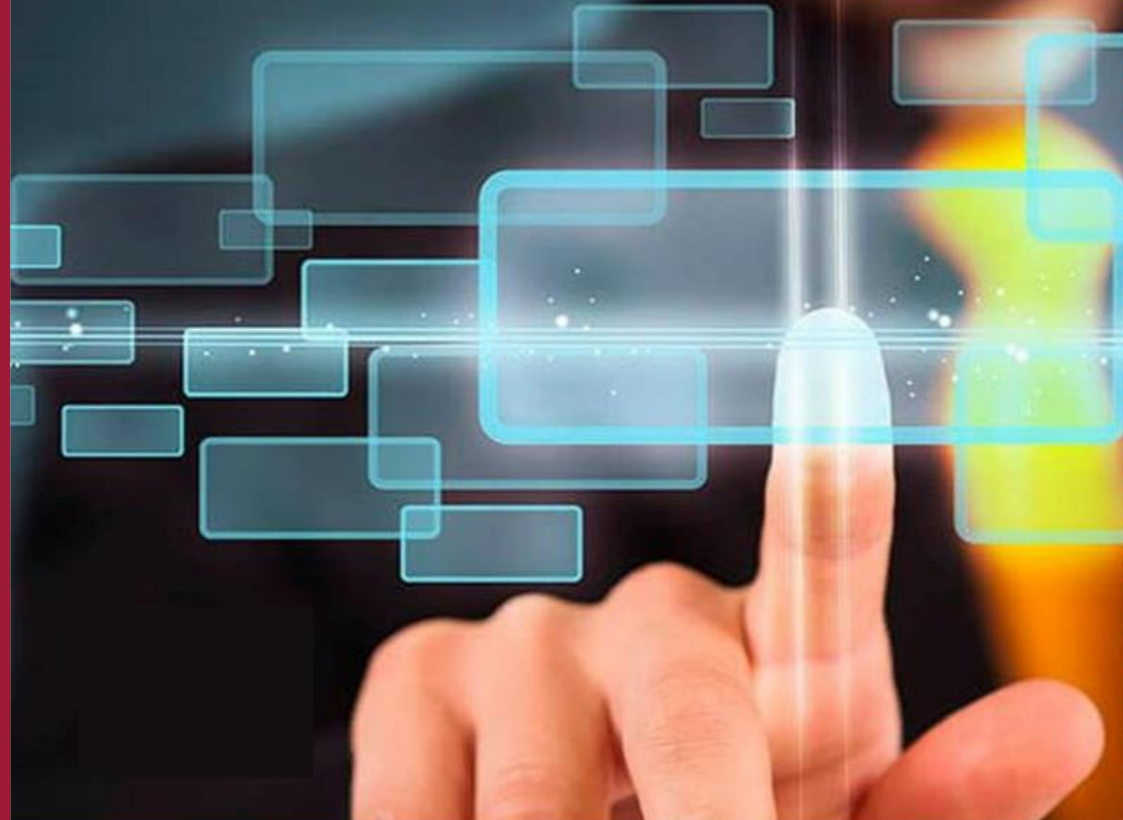


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CDTI Impact Monitoring report. R&D Projects completed in 2021-2022

Cuadernos CDTI
22



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1. Introduction

The **R&D projects** for which the CDTI grants funding under the instrument of **partially refundable aid** are aimed at creating and significantly improving production processes, products or services through technological innovation. Spanish companies can benefit from this aid, regardless of their size and the sector in which they operate.

The average duration of these projects is between two and three years, during which the companies commit themselves to carry out the activities according to the agreed milestones.

The **CDTI's monitoring system** provides detailed information on the results obtained by companies after the completion of these projects. In order to gather information in a more precise way, the monitoring considers two moments in the innovation cycle: the first is the conclusion by the company of the technological development work (**end-of-project phase**); the second is the moment when these results have been introduced into the market (**commercialisation phase**). This report focuses on the first phase.

The information is collected through a questionnaire completed by all beneficiary companies upon finalisation of the last milestone of the project. In total, between 2021 and 2022, information has been collected from **1,736 individual R&D projects**, which received funding worth 841 million euros, mobilising a total investment of 1,109 million euros; and from **529 company participations in cooperative R&D projects**, with a CDTI contribution of 284 million euros and a total budget of 365 million euros.

The interactive format of the report allows obtaining the data for each indicator according to several parameters: **year of completion of the project, technological area, size of the company and whether or not it has received ERDF funds** -the latter only in the case of individual projects-. In this way, users can obtain the metrics they are most interested in in a personalised way.

This document draws some general conclusions that can guide the use of the [interactive report](#), available at the CDTI website. The graphs below are an extract from the original report.

This edition includes for the first time data on the results of **cooperative R&D projects**, specifically for three instruments:

- CIEN consortia: Large pre-competitive research projects in strategic areas with potential international projection. The projects have a relevant participation of research centres, technology centres or singular national scientific and technical infrastructures (ICTS), and at least one of them must be publicly owned.
- National cooperation projects: R&D projects developed by a national consortium.
- International cooperation projects: submitted by Spanish companies participating in international technology cooperation programmes managed by CDTI (multilateral EUREKA, IBEROEKA and PRIMA programmes and bilateral CDTI programmes).

2. Monitoring dashboard I

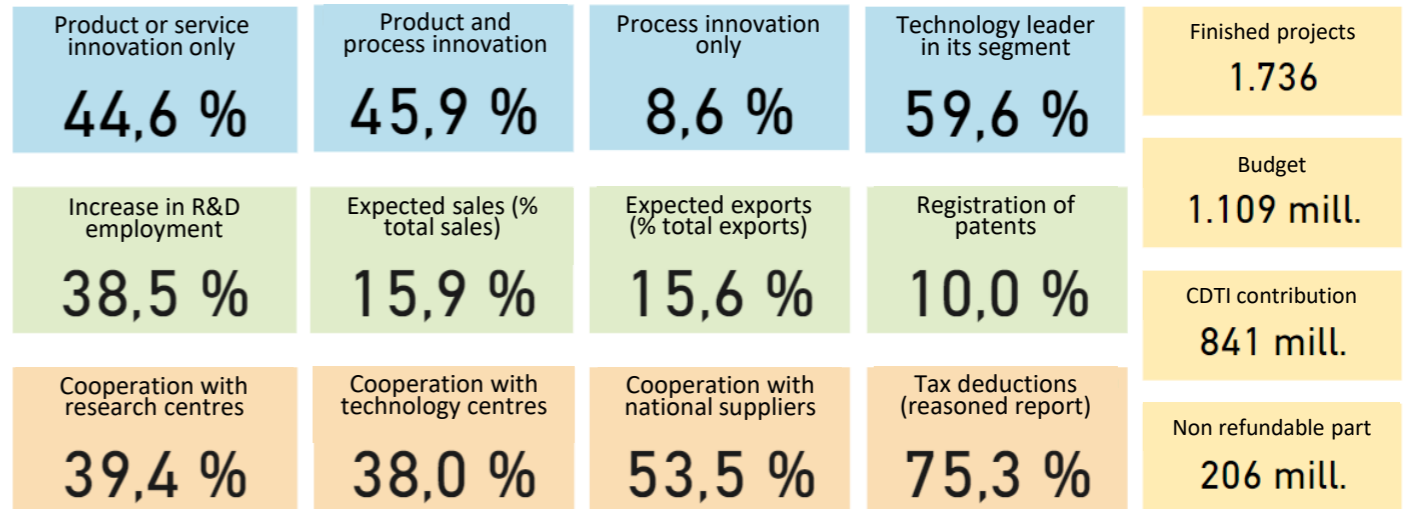
In this period, 38.5% of individual projects generated an **increase in R&D jobs**.

Expected sales and exports due to the project are close to 16% in both cases, and the rate of **technological leadership** (innovations new to the market) is close to 60%.

In terms of cooperation with different organisations, almost 40% of the companies collaborate with **research centres** or **technology centres**, and more than 50% with national suppliers.

For **SMEs**, the percentage of projects that create R&D jobs rises to 44%. Expected sales and exports are also higher, approximately 4 points above the overall average, while cooperation remains stable. Another notable indicator is the leadership rate, which stands at 62.5%.

Individual projects



3. Monitoring dashboard II

The report includes data on 227 company participations in projects within the **CIEN Programme**, 189 in **National Cooperation R&D Projects** and 113 in **International Cooperation Projects**. Together, these participations received 284 million euros and mobilised a total budget of 365 million euros.

The **international cooperation projects** are mainly focused on product innovations (96% of the projects), with a greater effect on sales and exports (11% and 14% respectively) and technological leadership (62%).

Projects with national partners cover a higher percentage of process innovations (52%) and have a slightly lower effect on sales (9.8%) and exports (12.6%).

CIEN consortia focus on cooperation with technology centres (90%) and public research centres (72%) and are less focused on the commercialisation of results (effect on sales and exports close to 6%).

CIEN consortia projects

Product or service innovation only	Product and process innovation	Process innovation only	Technology leader in its segment	Finished projects
49,3 %	39,6 %	8,8 %	46,3 %	227
Increase in R&D employment	Expected sales (% total sales)	Expected exports (% total exports)	Registration of patents	Budget
33,9 %	5,6 %	6,4 %	2,6 %	223 mill.
Cooperation with research centres	Cooperation with technology centres	Cooperation with national suppliers	Tax deductions (reasoned report)	CDTI contribution
72,2 %	90,3 %	55,1 %	71,8 %	173 mill.
				Non refundable part
				54 mill.

National cooperation projects

Product or service innovation only	Product and process innovation	Process innovation only	Technology leader in its segment	Finished projects
47,6 %	43,4 %	8,5 %	55,0 %	189
Increase in R&D employment	Expected sales (% total sales)	Expected exports (% total exports)	Registration of patents	Budget
24,9 %	9,8 %	12,6 %	2,6 %	91 mill.
Cooperation with research centres	Cooperation with technology centres	Cooperation with national suppliers	Tax deductions (reasoned report)	CDTI contribution
46,6 %	47,6 %	56,1 %	66,7 %	70 mill.
				Non refundable part
				17 mill.

International cooperation projects

Product or service innovation only	Product and process innovation	Process innovation only	Technology leader in its segment	Finished projects
57,5 %	38,9 %	2,7 %	61,9 %	113
Increase in R&D employment	Expected sales (% total sales)	Expected exports (% total exports)	Registration of patents	Budget
34,5 %	11,0 %	14,0 %	5,3 %	51 mill.
Cooperation with research centres	Cooperation with technology centres	Cooperation with national suppliers	Tax deductions (reasoned report)	CDTI contribution
44,2 %	43,4 %	41,6 %	66,4 %	41 mill.
				Non refundable part
				12 mill.

4. Description of projects and companies

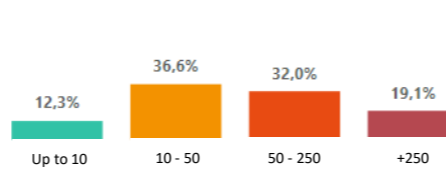
Among the individual projects, most of the companies (65%) have between 10 and 250 employees. Young companies, less than 5 years old, are a minority (14%). Almost half are mature companies, operating for more than 20 years. The percentage of sales devoted to R&D is less than 5% in more than 50% of companies. In SMEs, this figure drops to 43%, while 14% devote more than 50% of their turnover to R&D. More than 75% of companies have a continuous R&D activity.

In **CIEN consortia**, there is a greater presence of large and older companies (38% with more than 250 employees and 58% with more than 20 years of seniority) and also with continuous R&D activity (94%).

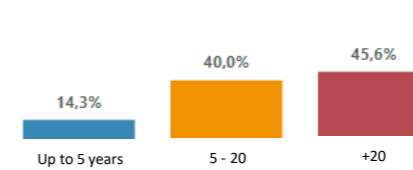
Those participating in **international cooperation projects** have a higher R&D intensity (53% dedicate more than 5% of their sales). The percentage of exporting companies is lower in **national cooperation projects** (79%), although it is in line with the rest.

Individual projects

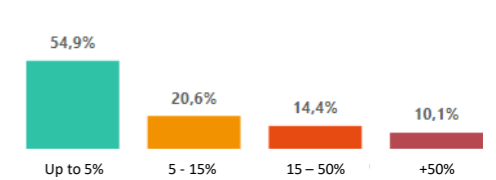
Number of employees (latest available year)



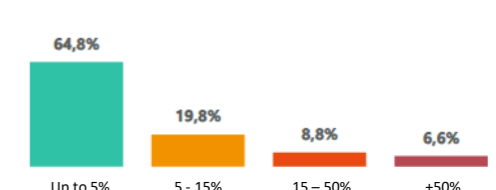
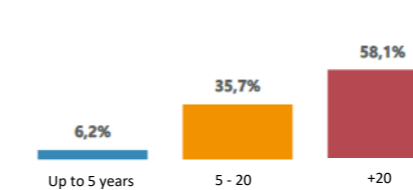
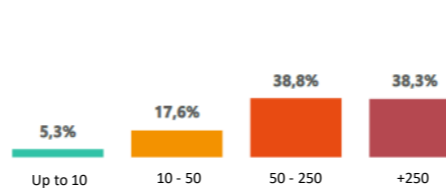
Age of company



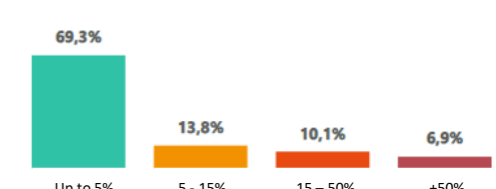
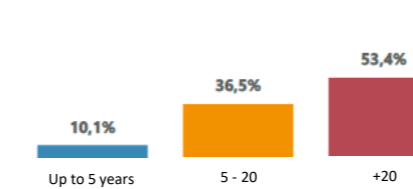
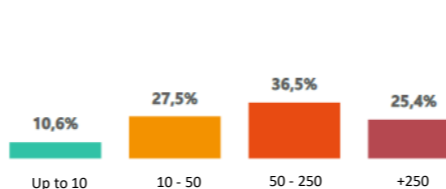
R&D effort (% sales)



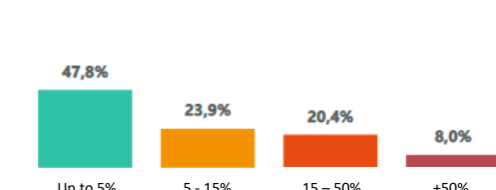
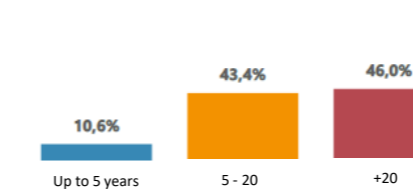
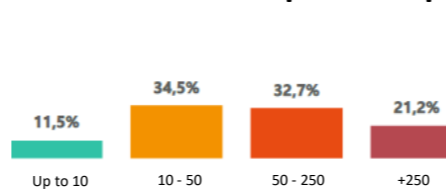
CIEN consortia projects



National cooperation projects



International cooperation projects



5. Indicators by region

The indicators of the monitoring dashboard can be consulted by region in the [interactive report](#). A summary is given below. These data have to be interpreted taking into account the representation of each region in the total number of completed projects (see graphs).

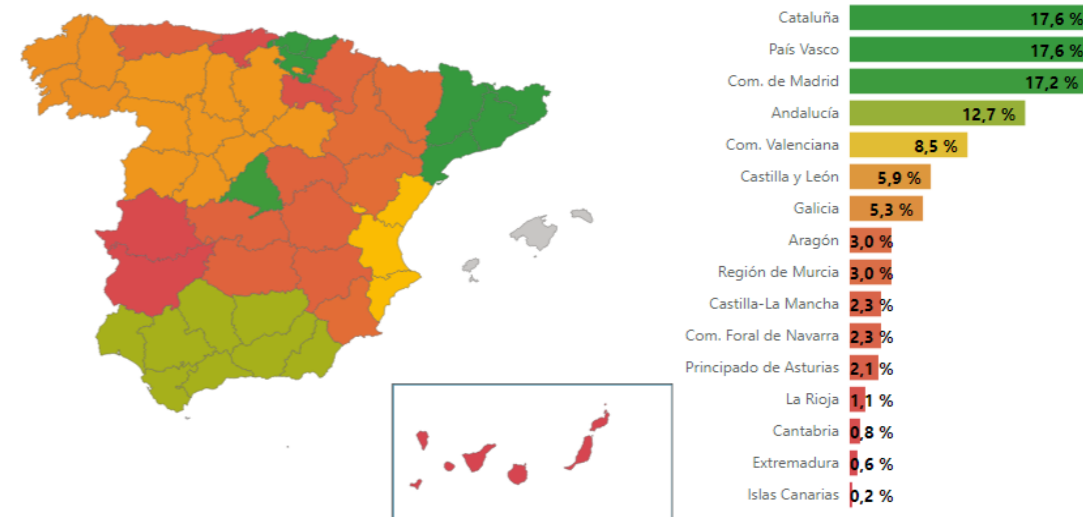
In the case of **individual projects**, Castilla-La Mancha, Murcia, Extremadura and Andalusia stand out in cooperation with research centres, while the Basque Country, Asturias, Aragon and Castilla y León lead in cooperation with technology centres. La Rioja leads in cooperation with national suppliers. Some regions with a lower volume of activity, such as Cantabria and the Balearic Islands, show the highest percentages in product and process innovation, while Aragon, Catalonia and Madrid lead in technological leadership. In terms of new R&D investment, Asturias, Extremadura and Galicia occupy the top positions.

Concerning **cooperation projects**, Cantabria, the Canary Islands, Extremadura and Andalusia stand out in cooperation with research centres, while in cooperation with technology centres, the Valencian Community, the Basque Country, Castile-La Mancha and Catalonia lead, and the Basque Country and Aragon in the case of cooperation with national suppliers. La Rioja ranks first in product and process innovation, while in technological leadership we find Murcia in a prominent position. In terms of new R&D investment, Cantabria, Extremadura, the Canary Islands and Galicia are the most dynamic regions.

Distribution of the number of individual projects by region



Distribution of the number of cooperation projects by region



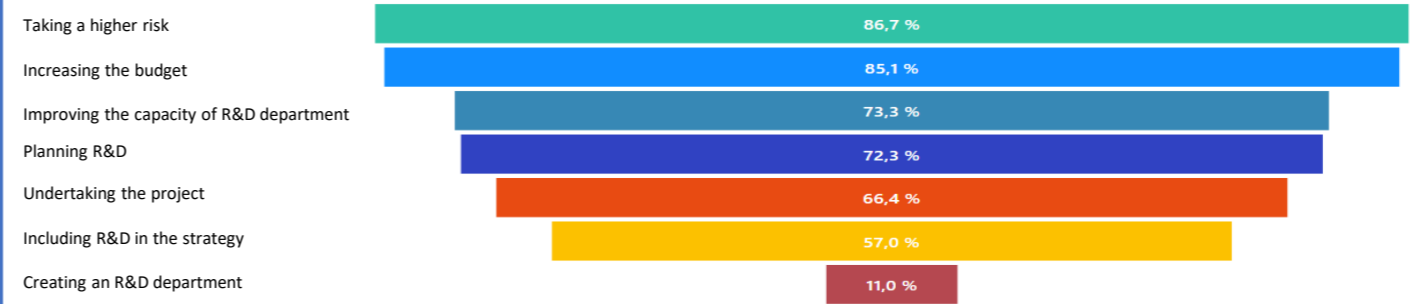
6. Impact of CDTI support on R&D strategy

In **individual projects**, CDTI support contributes to changing some of the companies' behaviour in terms of their R&D activity. In fact, 66.4% of the projects developed have been able to be carried out thanks to CDTI support, 73% in the case of SMEs.

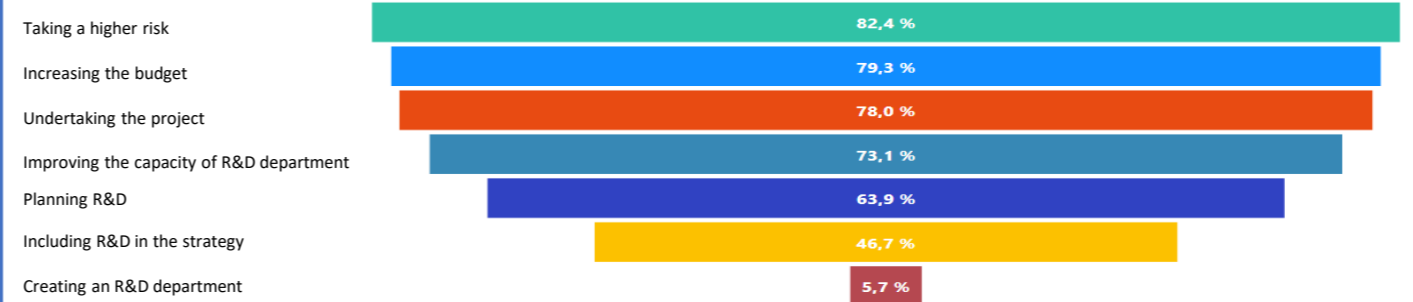
In general, the most remarkable effects of CDTI support on R&D strategy are taking on more risk and increasing the budget (85% of projects). Improving R&D capacity is very frequent (73%), although the creation of an R&D department is mentioned in only 11% of the projects. Improving R&D planning is an important effect in some technology sectors, such as Agriculture and fisheries (81.8%), Food (76.9%) or Chemicals (77.5%).

For **cooperative projects**, the effects on R&D strategy are similar in all three instruments: taking on more risk, increasing the budget and undertaking the project appear in most of the participations. The improvement of the R&D department's capacity in international cooperation projects stands out (82% of the participations). Developing a strategic approach based on R&D and creating a specific department for these activities occurs more frequently in projects with national partners.

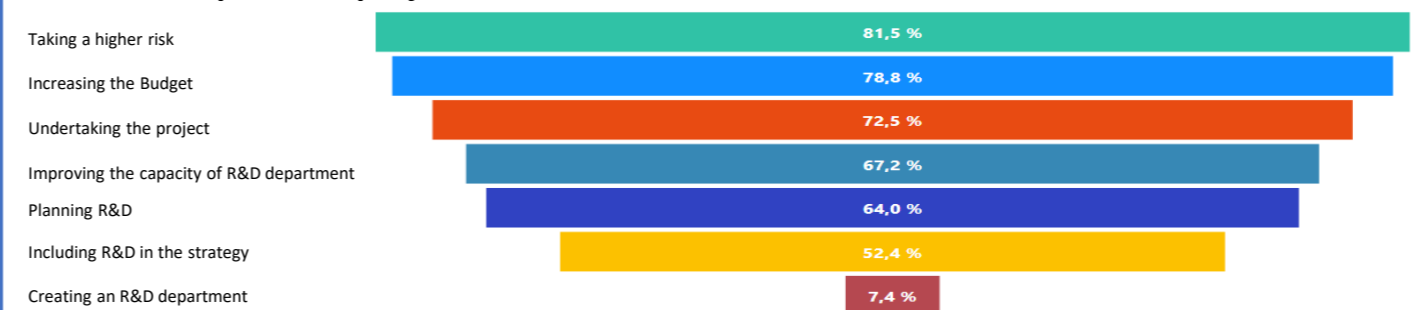
Individual projects



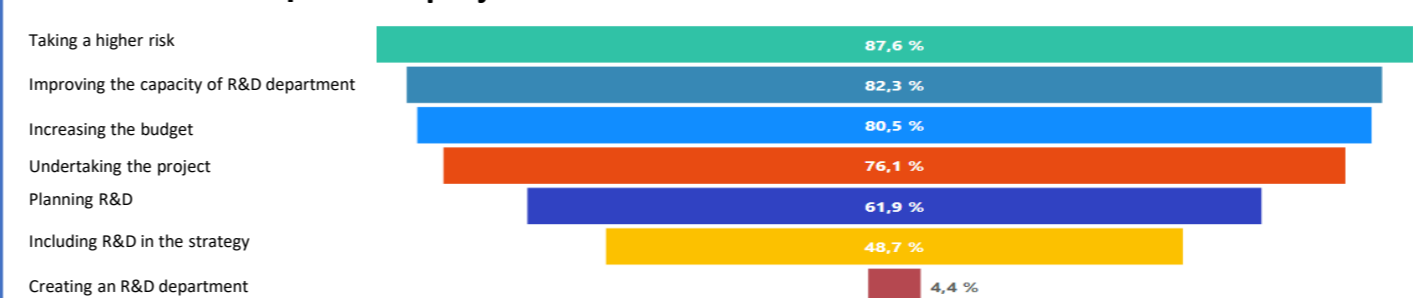
CIEN consortia projects



National cooperation projects



International cooperation projects



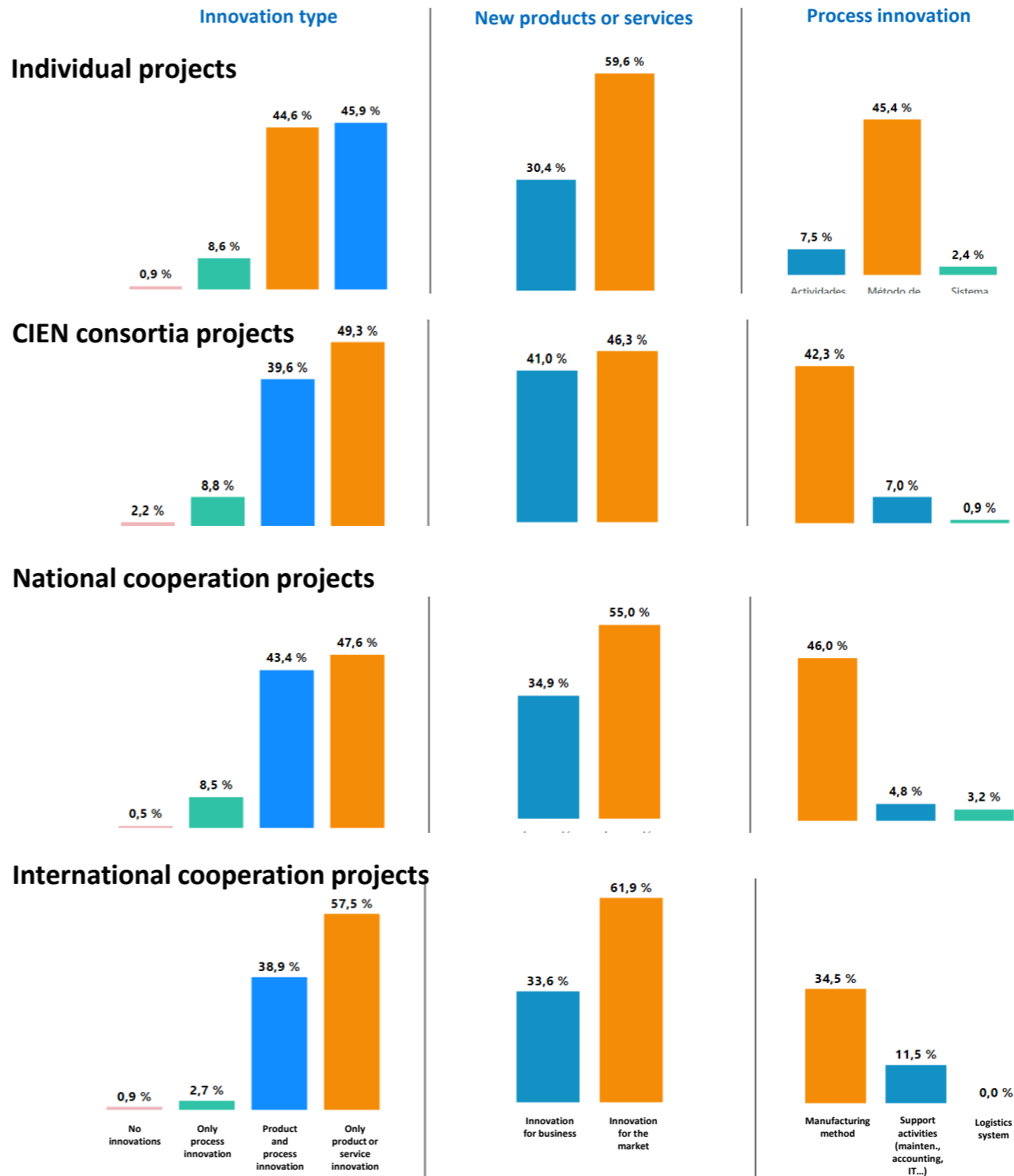
7. Type of innovation

In the case of **individual projects**, almost half of them generate simultaneous product or service and process innovation, and when they innovate in only one of the fields, it tends to be product or service innovation (44.6%). Just 8.6% innovate only in processes.

With regard to new products or services, 60% of the new products or services are innovations for the market as a whole (technological leadership), while 30% are innovations for the company. In terms of process innovations, those affecting the manufacturing method stand out, with 45.4% of the total.

In **CIEN Consortia** and **national cooperation projects**, process innovations have a greater weight, being present in 8% of cases in a unique way and in nearly 40% accompanying the development of new products. International cooperation projects focus on product innovations in 57% of the cases, with simultaneous process innovations in a further 39%.

The highest rate of technological leadership is found in **international cooperation projects** (62%), while it reaches 55% in national cooperation and 46% in CIEN consortia.



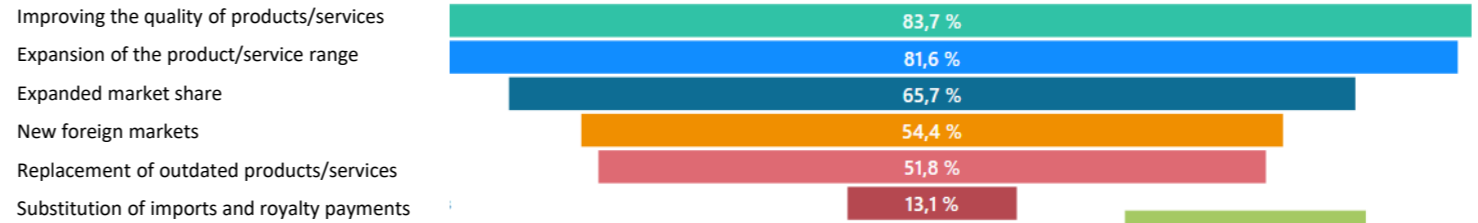
9. Effects on economic activity I

As far as the effects of innovations on products or services are concerned, among the **individual projects**, the most prominent are quality improvement and range extension. Both effects are present in more than 80% of the projects.

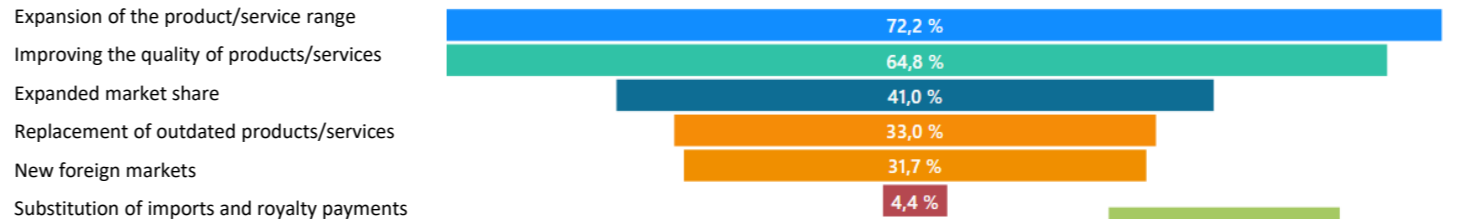
On the other hand, for the **cooperation instruments**, the extension of the range of products and services and the improvement of quality are at the top of the list. The expansion of market share is more frequent in national and international cooperation projects (about 50%) and the opening of new foreign markets is more frequent in projects with international partners (55%).

Individual projects

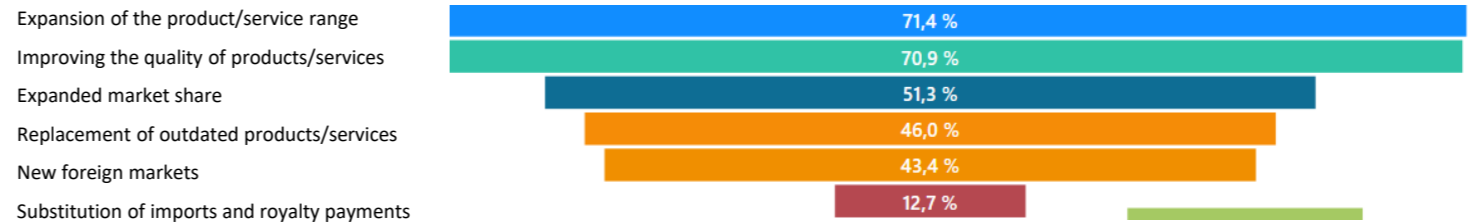
Effects of production/service innovations



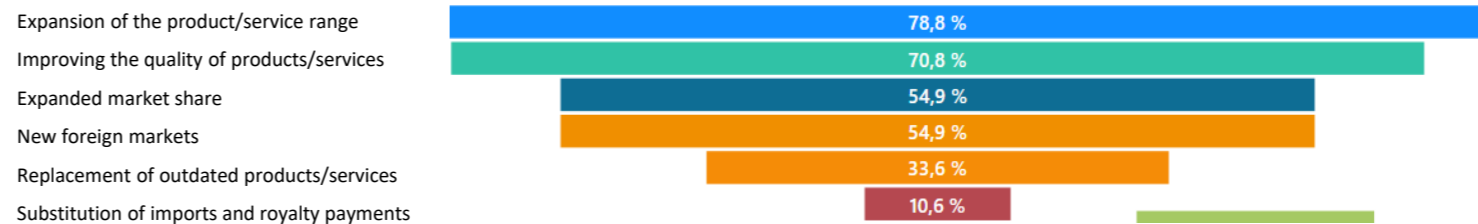
CIEN consortia projects



National cooperation projects



International cooperation projects



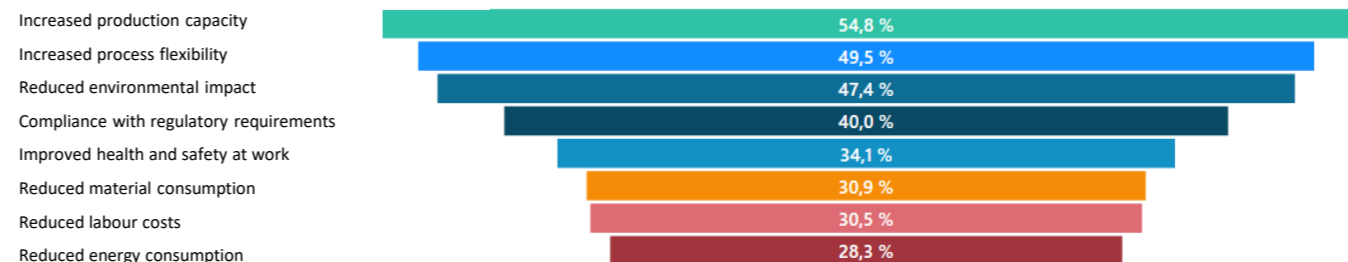
8. Effects on economic activity II

Among the **individual projects**, thanks to process innovations, companies increase their production capacity in more than half of the cases. It also leads to greater process flexibility and reduced environmental impact. Reduced energy consumption is the least prominent effect, although it is present in about 30% of the projects.

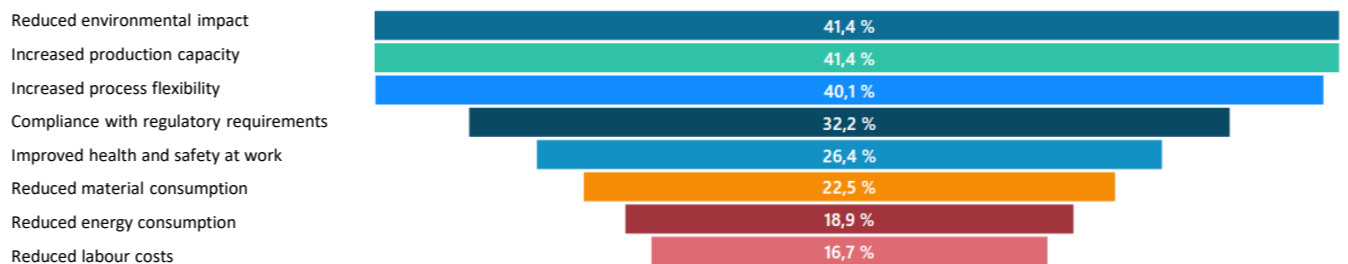
On the other hand, reduced environmental impact and increased production capacity are the most frequent effects in all three types of **cooperation instruments** (40-50% of cases). Effects related to the reduction of production costs (materials, energy and labour) are more frequent in national cooperation projects (around 30% of cases).

Individual projects

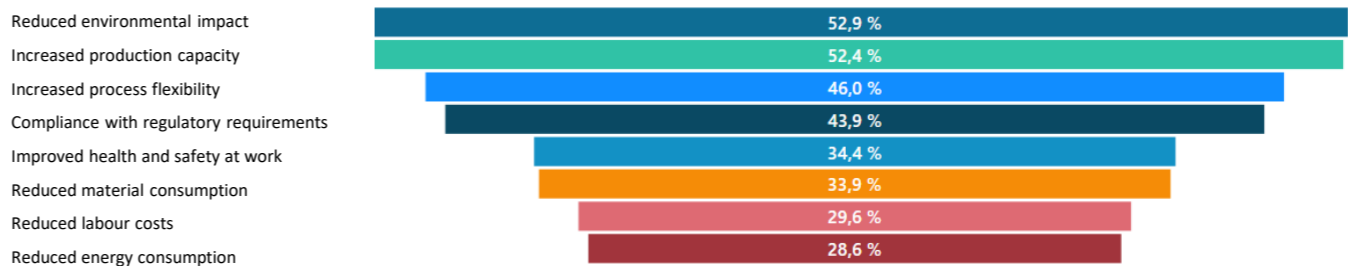
Effects of innovations: process



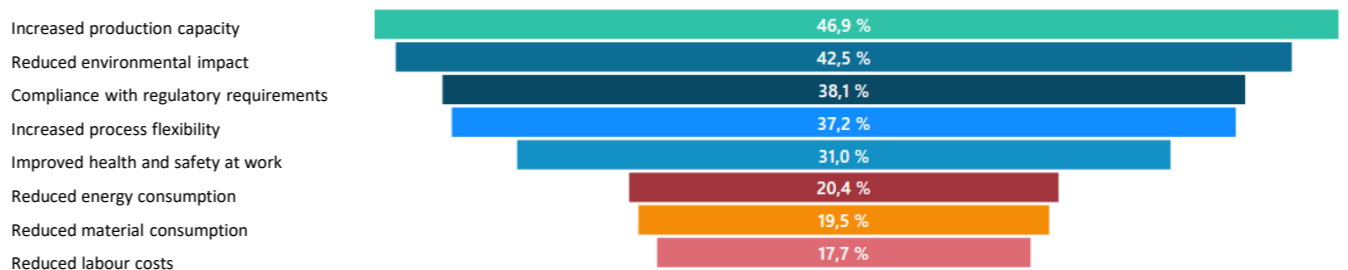
CIEN consortia projects



National cooperation projects



International cooperation projects



10. Effects on employment and training

In **individual projects**, job creation due to the project takes place in 45% of cases, but is moderate in terms of the number of jobs created per project (typically 5 or less). In the case of SMEs, the percentage of projects that generate employment rises to more than half of the cases (52%), a figure that drops to 33% for non-SMEs.

As far as training is concerned, technical training is the most encouraged, accounting for almost 60% of projects. Only 21% of the projects promote commercial training and the figure drops to 17% in the case of management training.

CIEN consortia and international cooperation projects record the highest figures for increased recruitment, exceeding 40%, while national cooperation R&D projects increase staff 33% of the time. Recruitment is also higher among SMEs than among non-SMEs.

On the other hand, **international cooperation projects** stimulate technical training to a greater extent, with more than 68%, also standing out in commercial training together with CIEN consortia (more than 20% in both cases). However, it is the **national cooperation projects** (10.1%) and the **CIEN consortia** (12.3%) which have the highest figures for management training.

Increase in employment in individual projects



Increase in employment in CIEN consortia projects



Increase in employment in national cooperation projects



Increase in employment in international cooperation projects



● 1 job created ● 1 - 5 jobs created ● +5 jobs created

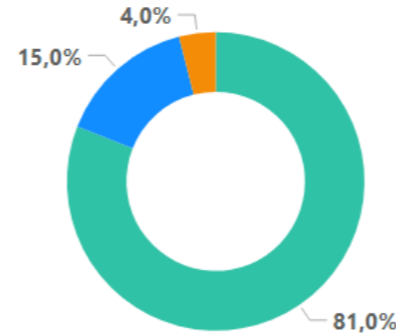
11. Expected commercial results I

For **individual projects**, the commercialisation of results is expected in the very short term: most companies (81%) state that it will be during the first year after the completion of the project. It should be noted that this figure varies considerably between technology areas.

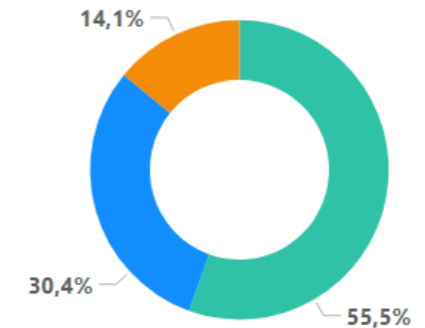
CIEN consortia generally show a lower proximity to the market in terms of time, with 45% of projects needing more than one year to commercialise results. For **national cooperation projects** this percentage is 34%.

On the other hand, more than 70% of **the international cooperation projects** plan to commercialise within the first year after completion of technology development. As in the case of individual projects, the differences between technology areas are very relevant for all three instruments.

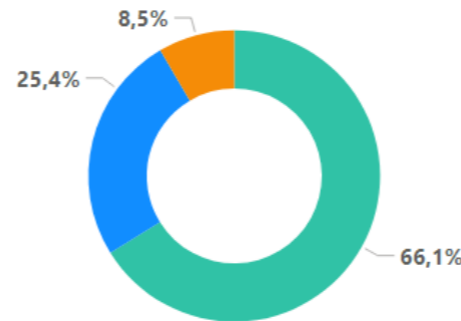
Expected time to commercialisation in individual projects



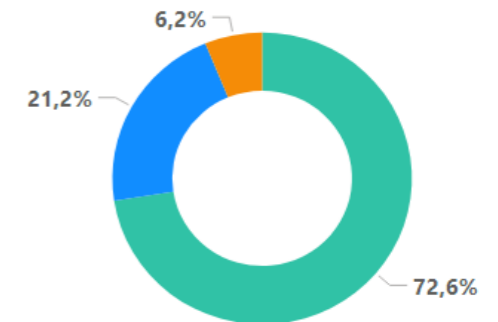
Expected time to commercialisation in CIEN consortium projects



Expected time to commercialisation in national cooperation projects



Expected time to commercialisation in international cooperation projects



● During 1st year
 ● 2nd - 3rd year
 ● After 3rd year

12. Expected commercial results II

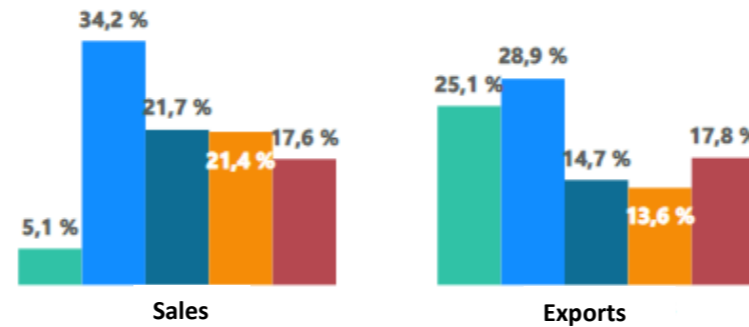
In **individual projects**, 61% of companies expect their project results to generate more than 5% in sales two years after entering the market. Only 5% of the projects will not generate new revenues. As for exports, in 25% of the cases no effect due to the project is foreseen.

The **CIEN consortia** show in general a lower closeness to the market in terms of expected volume of activity, with 14% of the projects not expecting any increase in turnover and 36% not expecting any increase in exports.

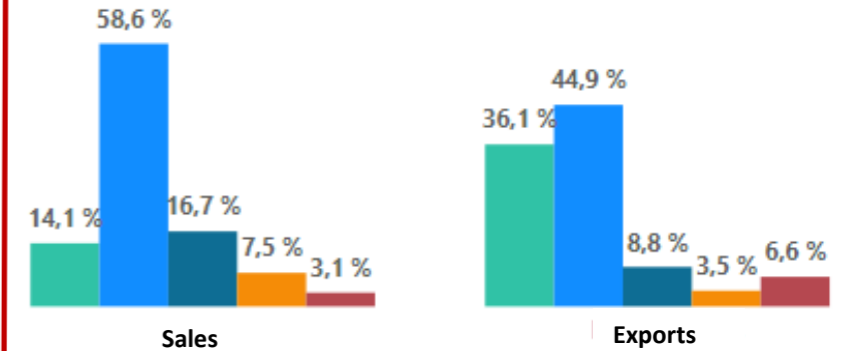
Considering the percentage of projects that will generate increases of more than 5% in sales, the differences are clear: in the case of **CIEN projects**, this percentage stands at 27%, while in **national cooperation projects** it reaches 41% and in **international cooperation projects** it reaches 57%.

Expected increase in sales and exports two years after commercialisation

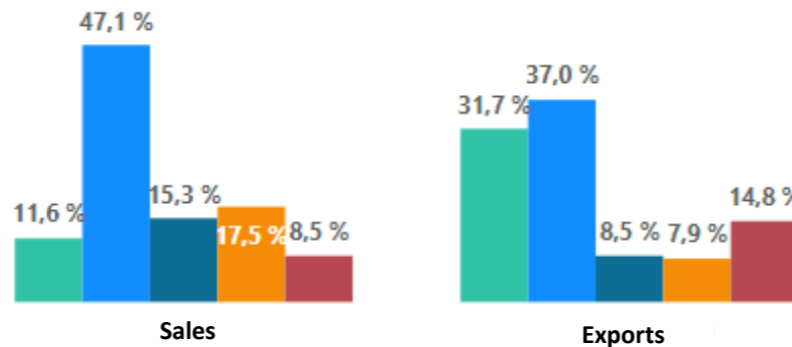
Individual projects



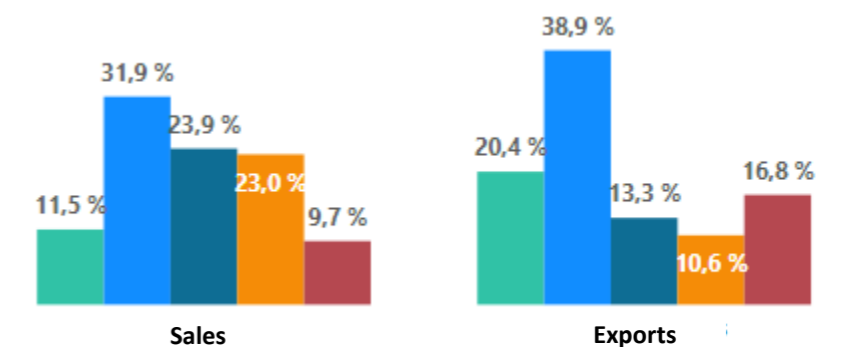
CIEN consortia projects



National cooperation projects



International cooperation projects



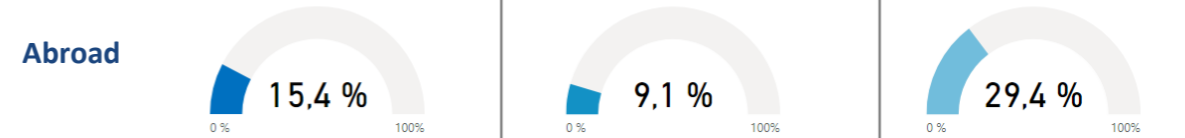
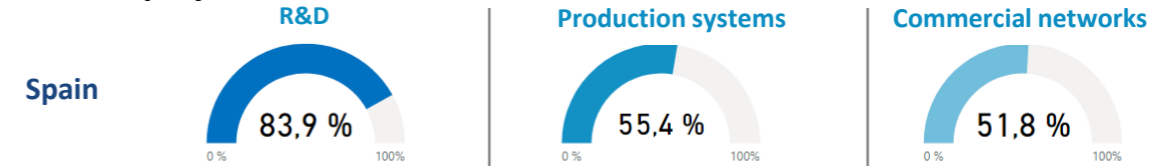
● No increase
 ● Up to 5%
 ● 5 – 10%
 ● 10 – 25%
 ● +25%

13. Planned investments resulting from the project

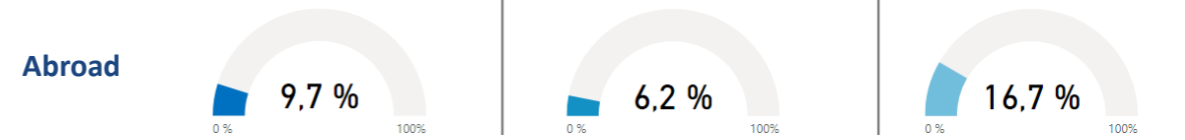
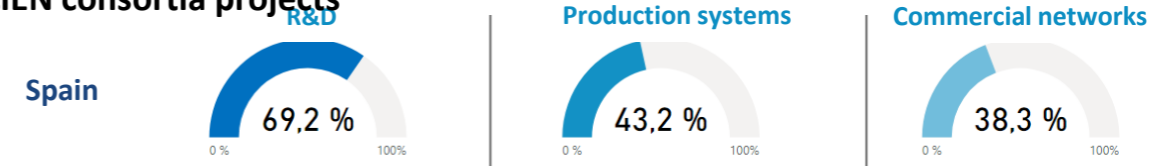
In the **individual projects**, the dynamising effect in terms of private investment in R&D appears in most cases. In 84% of the projects, companies plan to make new investments in Spain, a percentage that rises to 87% in the case of SMEs. As for investment plans in production systems and commercial networks, the percentages are lower, but also significant, with more than half of the projects. As for international investments, they are more frequent in the commercial sphere, with almost 30% of projects, a higher figure for SMEs, with 7 percentage points above the average.

In the case of **cooperation projects**, the effect on private investment in R&D is more frequent when they are carried out in international cooperation (85%), although it is also considerable in the other instruments (78% in national cooperation and 69% in CIEN Consortia). Projects in national cooperation show a greater tendency to strengthen production systems (53% of cases), while having international partners is linked to a greater effort in commercial networks (56%). The international activity of the companies is also considerably reinforced in the cooperation projects (both national and international), which show a greater interest in R&D investments (up to 29%) and in production systems (around 14%). The greatest efforts in the international field are made in commercial networks (from 16% in CIEN Consortia to 32% in international cooperation projects).

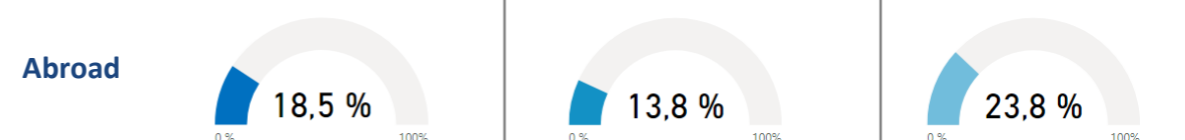
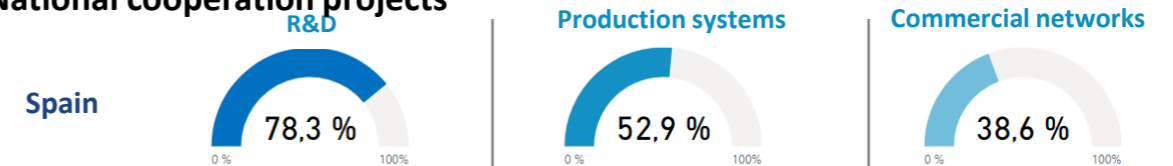
Individual projects



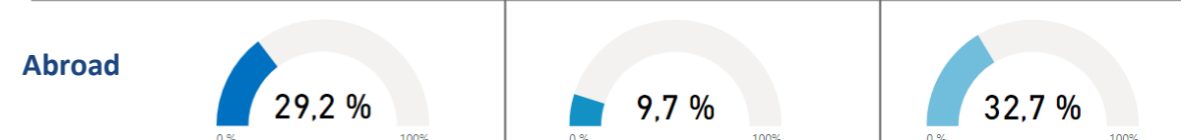
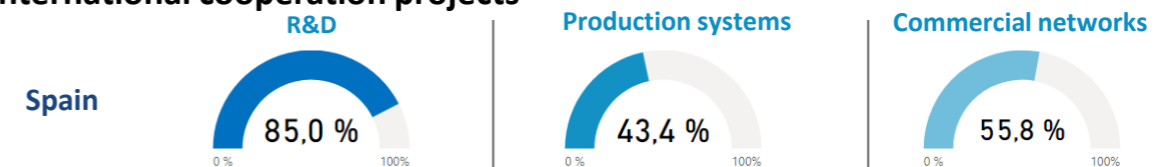
CIEN consortia projects



National cooperation projects



International cooperation projects



14. Intellectual property protection

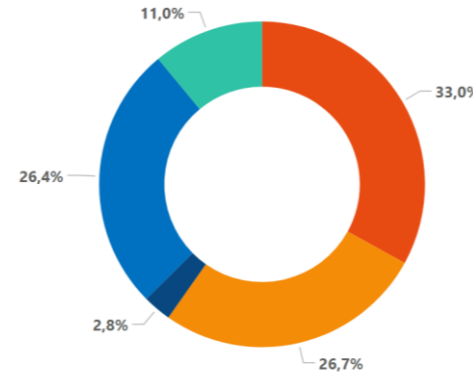
In **individual projects**, 10% of the beneficiaries applied for patents, with Biotechnology (26.7%) and Pharmaceuticals and health (25.6%) standing out by technological area, followed by Energy (20%) and Capital goods (19.7%). As for trademark registration, the average rate is 6.2%, although among SMEs it reaches 8.2%, while for non-SMEs it drops to 2.8%. In this case, the areas of biotechnology (20%) and pharmaceuticals and health (12.8%) also have the highest percentages.

Among **cooperation projects**, the frequency with which patents are registered is lower (only 2.6% in CIEN Consortia and national cooperation projects), although there is a greater tendency to patent the results of international cooperation (5.3%). This could be due to a shorter time lag between project completion and the decision to patent, as the percentage of projects in the study or evaluation phase is much lower than in the other instruments.

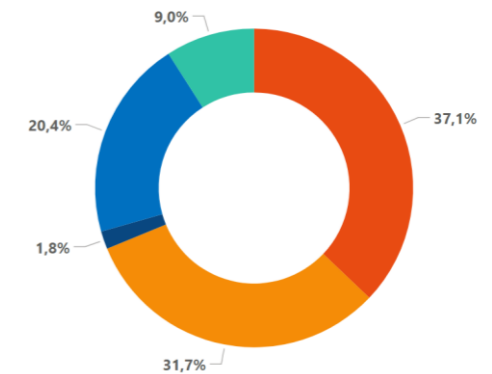
The **reasons for not patenting** follow a similar pattern in all instruments, with the exception mentioned above. Between 30 and 20% of the beneficiaries use industrial secrecy to protect their innovations, while about 40% of the project participations would not adapt to the patent system, according to the companies.

Reasons not to patent

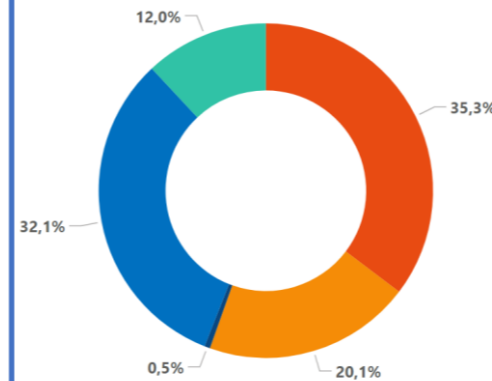
Individual projects



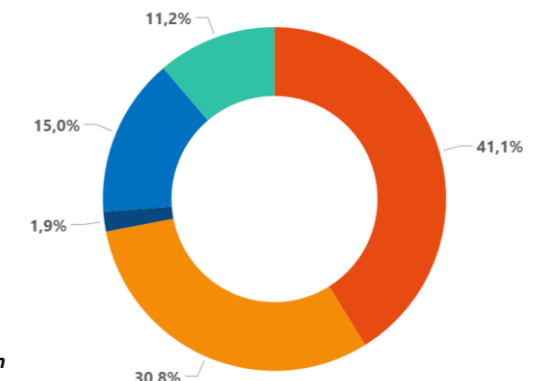
CIEN consortia projects



National cooperation projects



International cooperation projects



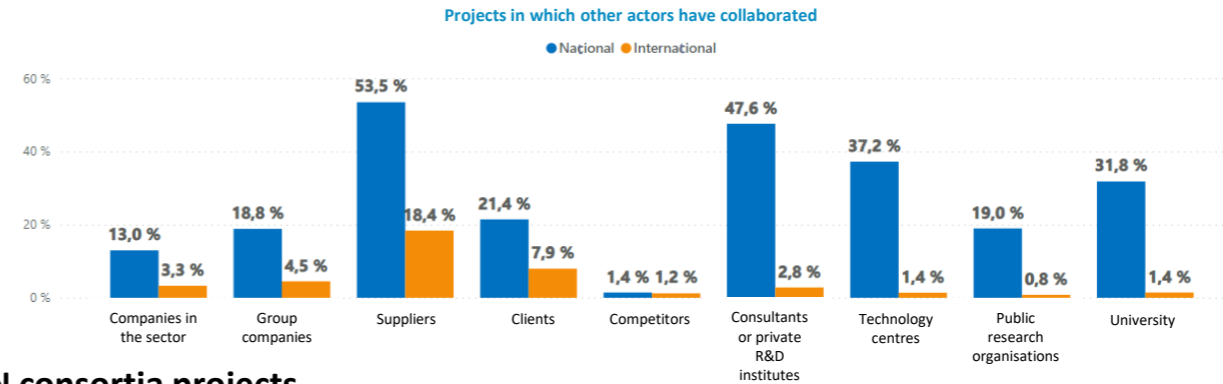
- *Not relevant for this project*
- *Trade secret has been chosen*
- *High registration and defence cost*
- *Under study or evaluation*
- *Other reasons*

15. Cooperation in R&D projects

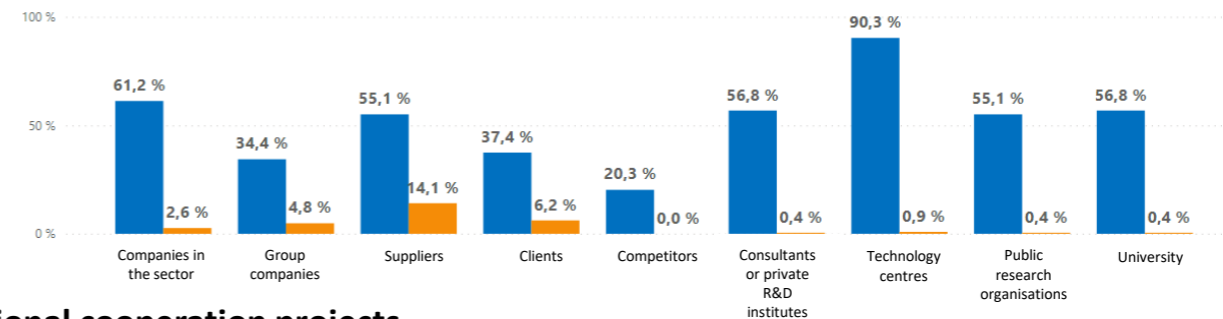
Although collaboration with other entities is not a requirement for receiving grants in **individual projects**, more than 93% involve other actors (national and international). Suppliers and private consultancy firms appear most frequently, in 53.5% and 46.6% of cases respectively. From the point of view of public-private collaboration, technology centres and universities are present in 37.2% and 31.8% of cases, respectively. In the international sphere, suppliers (18.4%) and customers (7.9%) stand out as partners.

In the case of **cooperation projects**, it is generally observed that the patterns of collaboration by type of partner respond to the characteristics of each instrument. Thus, collaboration with public research centres and technology centres is more frequent in CIEN consortia. Most of these are collaborations in Spain. Similarly, the projects developed in international consortia show a pattern closely linked to foreign partners, whether they are companies (from the sector, the group, suppliers or clients) or research organisations. National cooperation shows a balance between partners in the two areas, with the position of suppliers standing out.

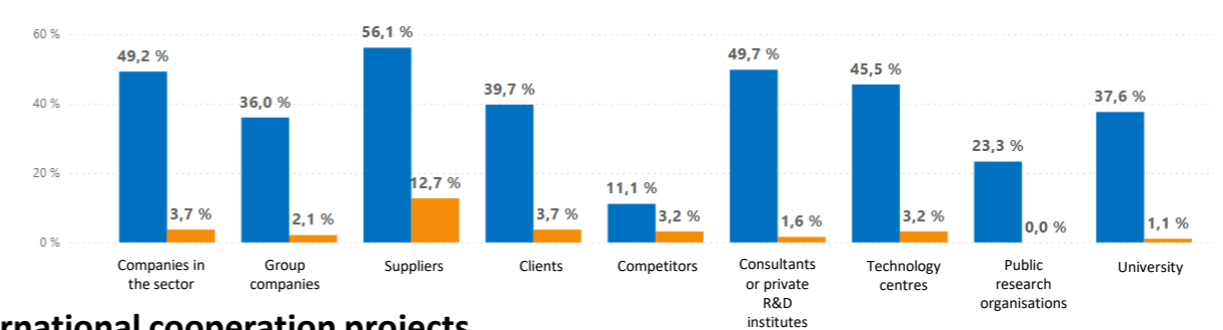
Individual projects



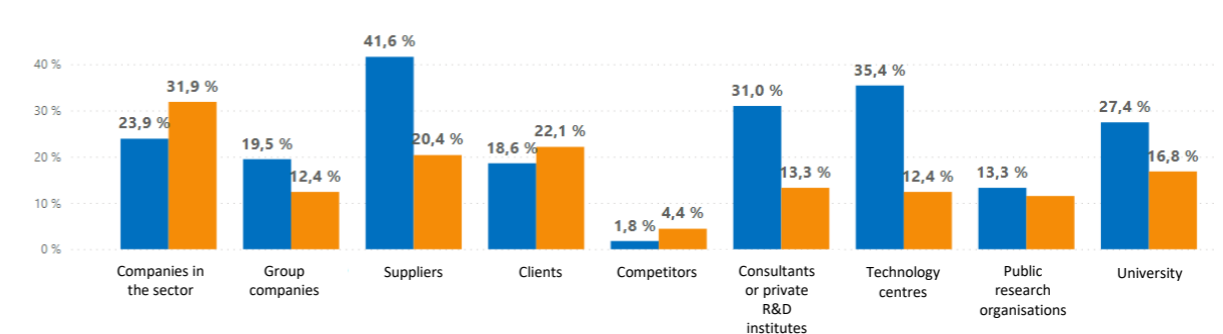
CIEN consortia projects



National cooperation projects



International cooperation projects



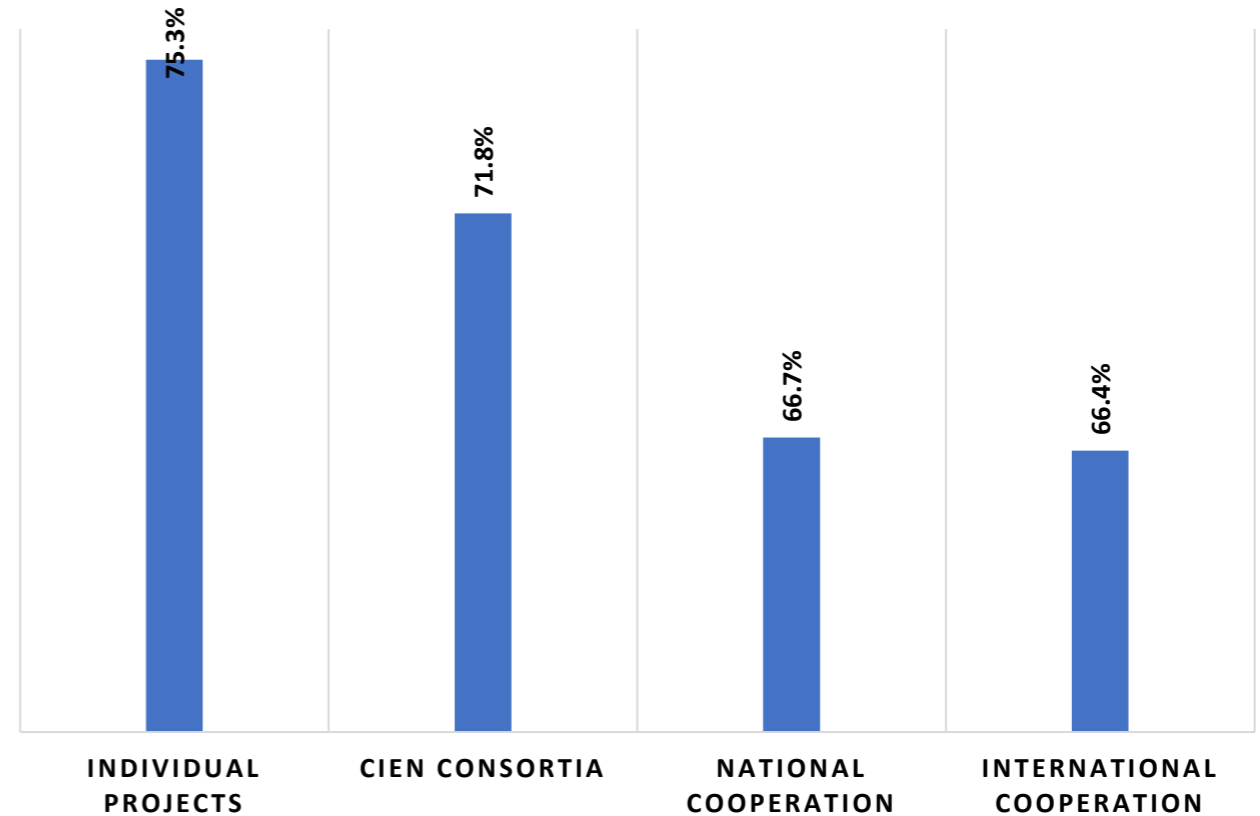
16. Tax credits

The CDTI was authorised in 2007 (Real Decreto 2/2007) to issue reasoned reports on the R&D projects it finances. The CDTI's action therefore makes it possible to complement the funding it grants with access to tax deductions. The company can request the report from the CDTI from the moment it signs the financing contract associated with the corresponding project.

Among the **individual projects**, in 75% of the cases companies requested the reasoned report issued by CDTI and used it to apply the corresponding tax deductions. The percentage is somewhat higher for SMEs (78%).

With regard to **cooperation projects**, companies participating in CIEN Consortia most frequently benefit from tax deductions on the basis of the reasoned report issued by CDTI (72%). The geographical scope of the collaboration does not determine the use of these incentives, as the percentage is similar for national and international cooperation projects (66%).

Tax deductions using the CDTI reasoned report

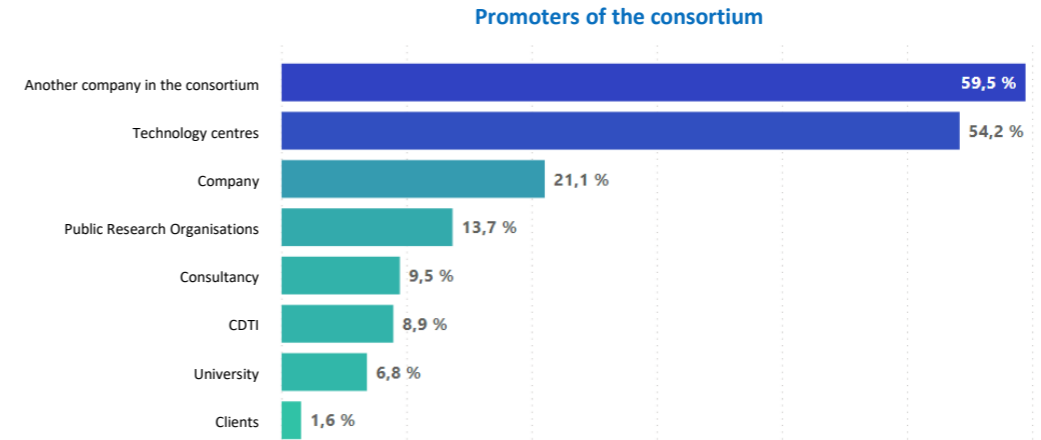


17. Consortium promoters

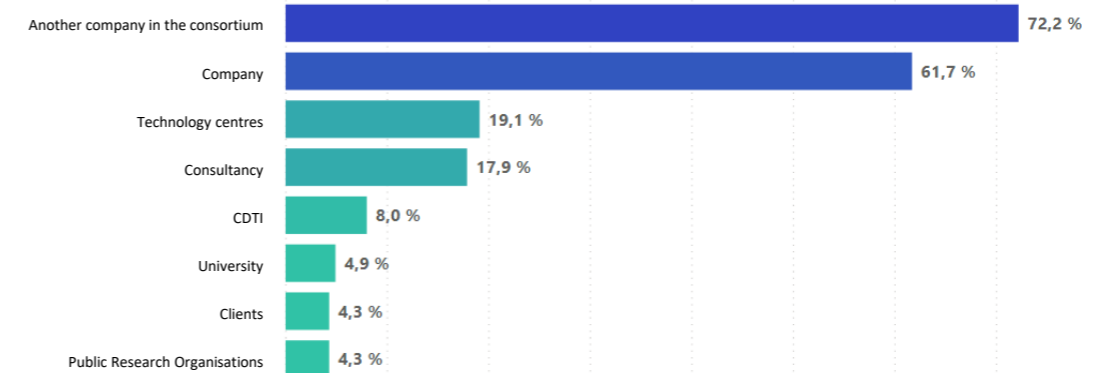
In most cases, the companies that form part of the consortium are the promoters of the collaboration, and this is the case in all three instruments considered. The technology centres come in second place, but with unequal weight. Thus, in the **CIEN consortia**, they promote 54% of the projects, while in the other cases this figure reaches approximately 20% of the participations. When the CDTI acts as a consortium promoter, it does so in support of other actors, and rarely as the sole promoter.

On the other hand, CDTI support granted through **CIEN consortia** has helped companies to participate in cooperative projects in 39% of cases, while in 17% of cases it has facilitated the search for partners. These percentages are lower for **international** (24% and 7% respectively) and **national** (10% and 5%) **cooperation projects**.

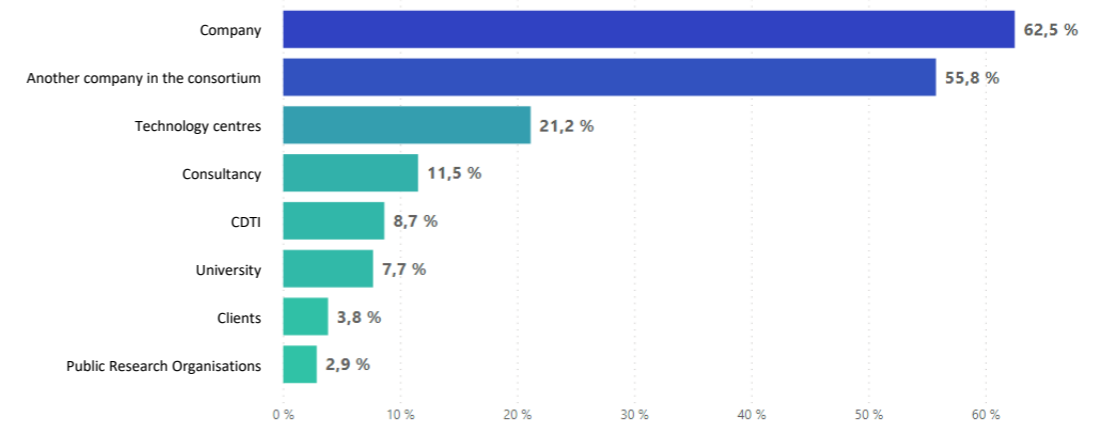
CIEN consortia projects



National cooperation projects



International cooperation projects



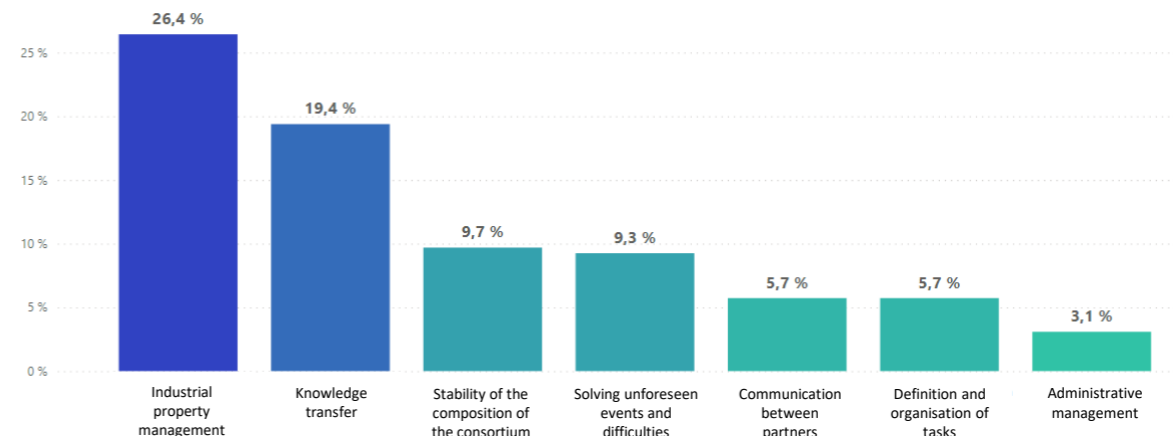
18. Difficulties in cooperating

The management of industrial property appears to be the aspect that generates the most difficulties when it comes to cooperation, together with the management of knowledge transfer. These two indicators are closely related, since one of the conditions for being able to carry out knowledge transfer processes in an appropriate manner is to define the ownership of the knowledge beforehand. It would also be related to the low rate of patent registration reported by companies.

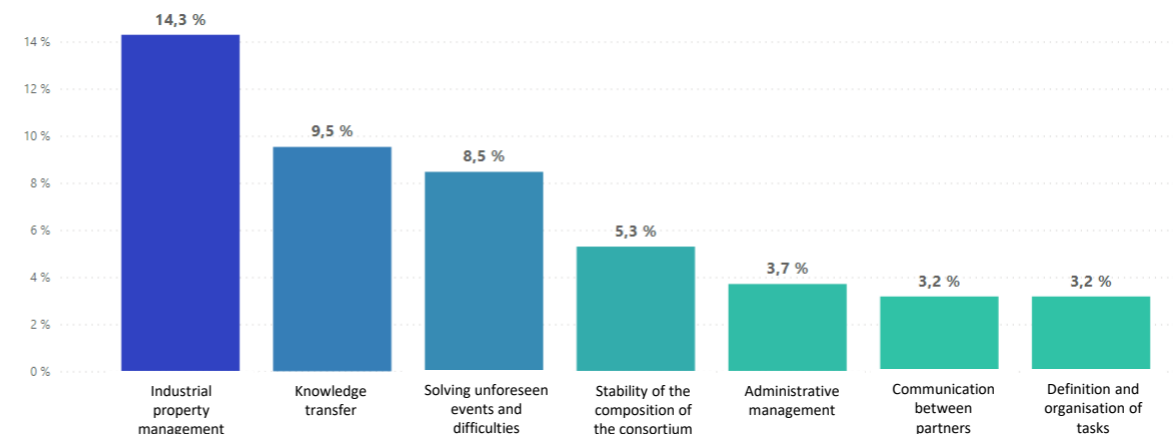
Stability in the composition of the consortium is more frequently mentioned in **CIEN consortia** and in **international projects**, where the solution of unforeseen events is a concern for 14% of the participants.

In general, issues related to administrative management and organisation of tasks are the least problematic aspects.

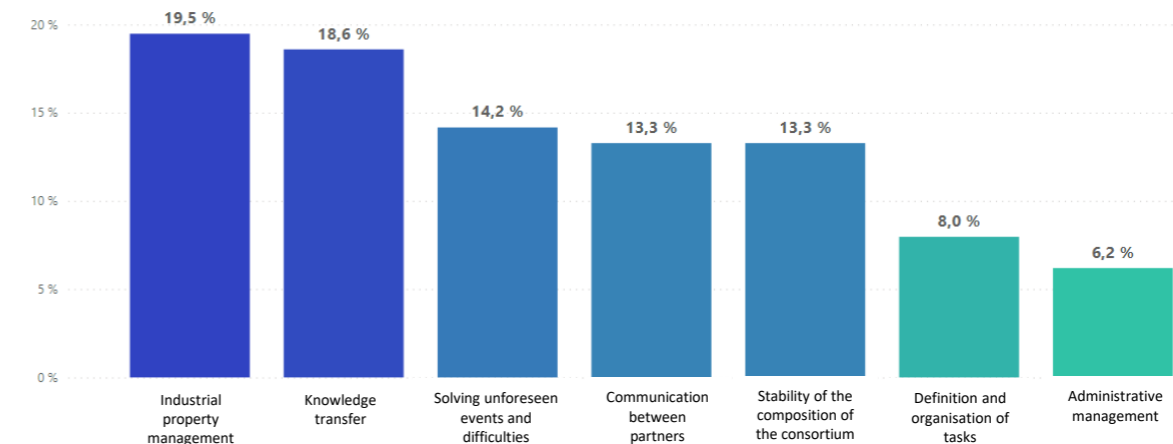
CIEN consortia projects



National cooperation projects



International cooperation projects



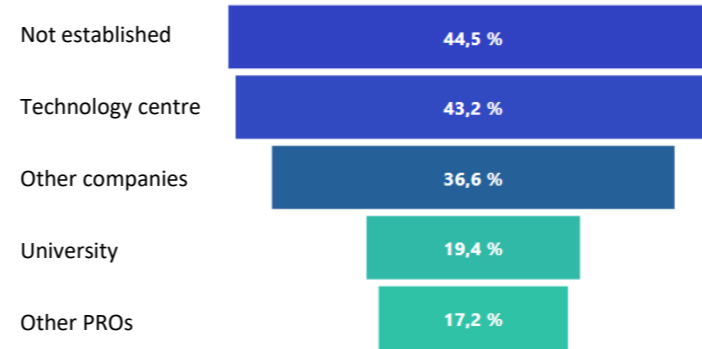
19. Strengthening cooperation

Approximately half of the projects have helped to consolidate medium/long-term collaborative relationships, which have materialised in subsequent projects.

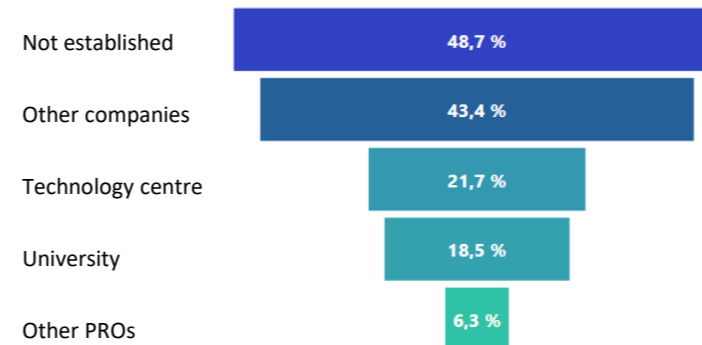
The most frequent partners are other companies in the project, except in the CIENs, where technology centres are the priority partners (44 and 53% of cases).

Collaboration with universities also receives greater encouragement in the CIEN consortia (20%), in this case with very similar percentages to the PROs. The weight of PROs is significantly higher in CIEN consortia (17%-20%) than in the rest of the instruments (4%-6%).

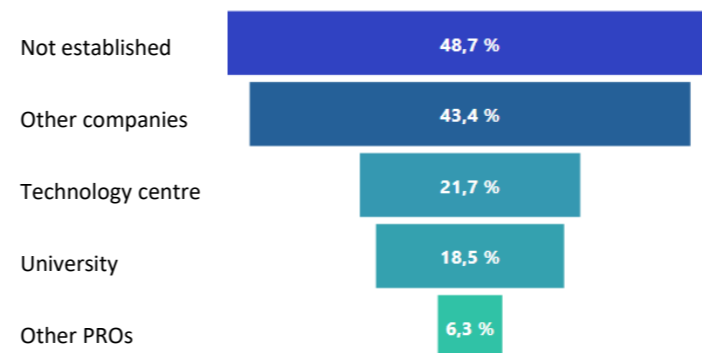
Medium/long technical collaboration with partners CIEN consortia projects



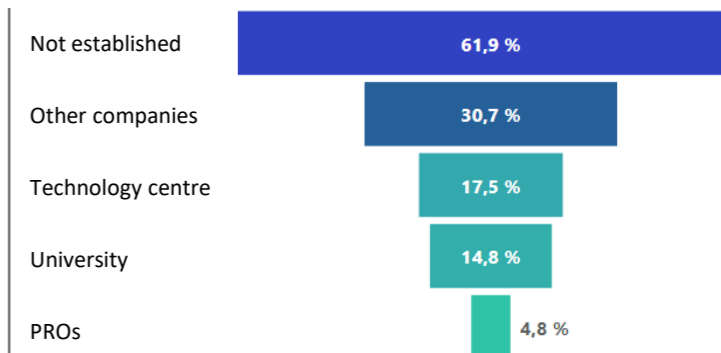
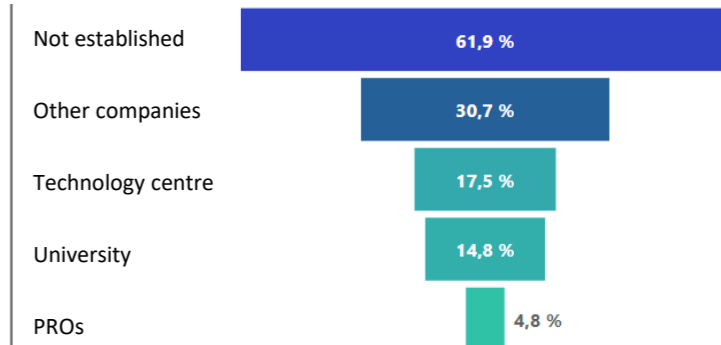
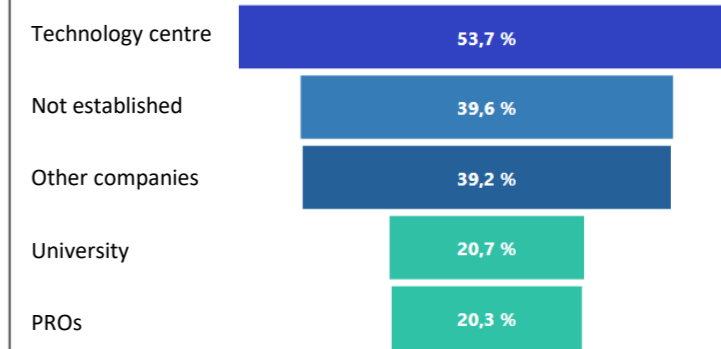
National cooperation projects



International cooperation projects



Participation in other technology collaboration programmes with partners



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