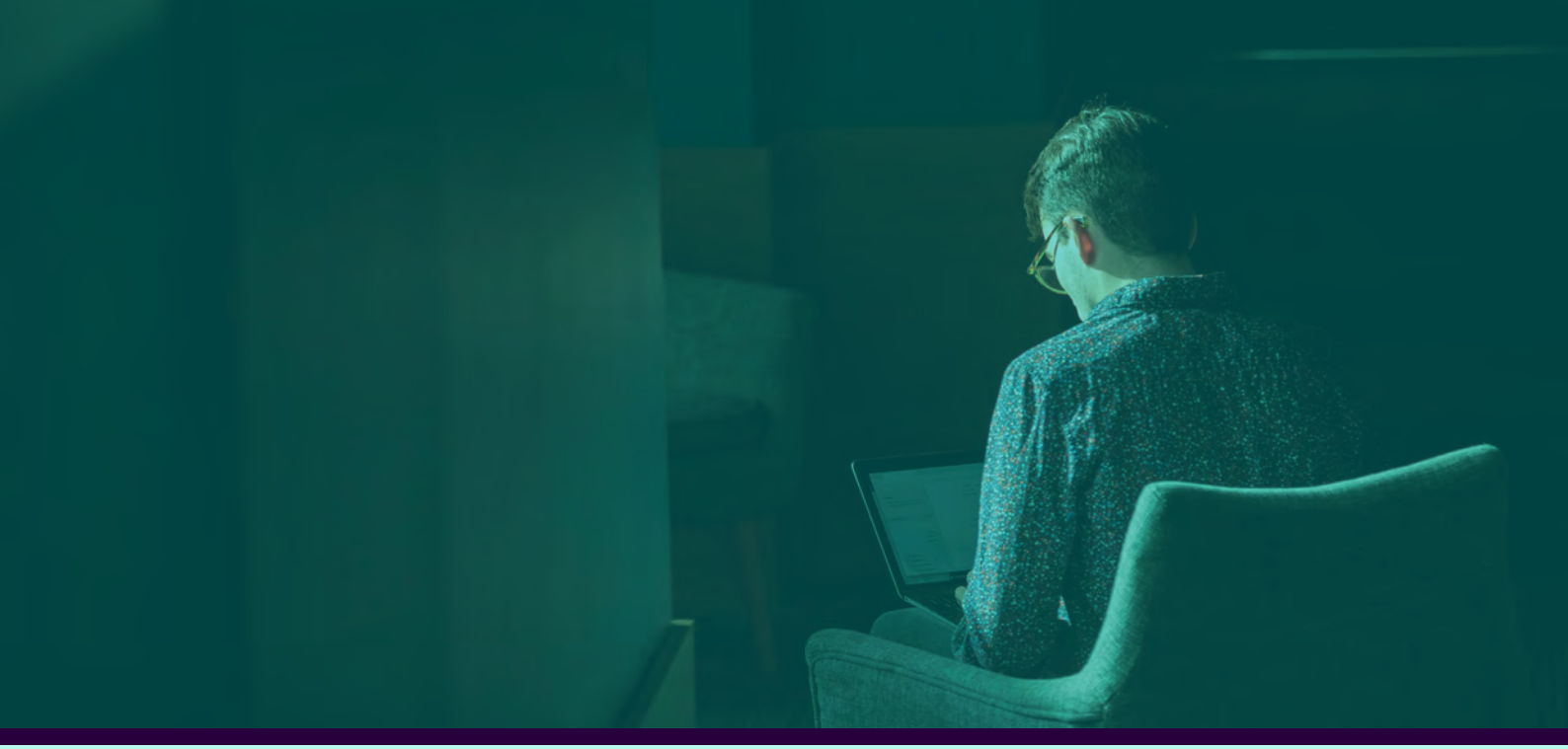

Global Knowledge, Local Impact – International Industrial PhD Students and Internships for a Stronger Sweden

A report to highlight how collaboration via international industrial PhD students and internships for early career researchers can strengthen Sweden's competitiveness and role as a leading knowledge nation

euraxess RESEARCHERS IN MOTION | LINKÖPING SCIENCE PARK | Swedish Agency for Economic and Regional Growth

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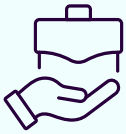
Introduction

Sweden has long been one of the world's most knowledge-intensive and innovative countries. However, this position is now threatened by a growing challenge: a shortage of skills. To maintain Sweden's leading role in research and innovation, a continuous influx of new PhD students is required. At the same time Engineers of Sweden's (Sveriges Ingenjörer) report *Doktorandkrisen – ett hot mot svenskt välstånd (The PhD Crisis – A Threat to Sweden's Prosperity)*[1], shows that the number of PhD students in Sweden is decreasing – a worrying trend that risks slowing down development.

The need for expertise is evident across several sectors. According to TechSverige's report *Kompetensbehoven inom tech (Skills needs in tech)*[4], approximately 18,000 new employees are needed annually in the tech sector until 2028 to meet demand. In the chemical and innovation industries, the industry organisation The Innovation and Chemical Industries' (IKEM) report, *Fler forskarutbildade önskas (More research educated are needed)*[16], highlights a need to recruit between 4,000 and 8,000 PhD-trained individuals by 2030. These figures underscore the importance of ensuring access to qualified professionals with research backgrounds.

Against this backdrop, it is essential that various societal actors – academia, industry, government agencies, and other organisations – work together to find solutions to the skills shortage.



New and improved forms of collaboration are needed to strengthen the link between research and practice, and to enhance the innovative capacity of Swedish companies. Such collaboration is crucial for Sweden to maintain its role as a leading knowledge nation in an increasingly globalised and competitive world.

The purpose of this report is to explore how the collaborative model of industrial PhD students and internships for early career researchers can be strategically used to deepen the relationship between academia and industry. It specifically focuses on analysing the potential to increase the number of international industrial PhD students, which could contribute to both skills provision and the internationalisation of Swedish research. Furthermore, the report examines how internships for researchers – primarily PhD students and postdocs – can be developed as a concrete and effective form of collaboration between academic institutions and companies.

Although the study's focus is on international industrial PhD students, it was identified early on that many of the challenges affecting the broader group of industrial PhD students are also relevant to international candidates. Therefore, the report includes these aspects as well.

This investigation has been authored by representatives from EURAXESS Sweden and Linköping Science Park, with funding from the Swedish Agency for Economic and Regional Growth (Tillväxtverket), as part of the *Work in Sweden* initiative.

Summary

Challenges and Opportunities for Industrial PhD Students in Sweden

Sweden is facing a growing skills shortage in research and innovation, threatening the country's position as a leading knowledge nation. At the same time, the number of PhD students is declining, despite a significant need for research-trained professionals in both the public and private sectors. To address this challenge, sustainable and strategic forms of collaboration between academia and industry are required. Industrial PhD students represent one such model – a bridge between academic research and practical application.

By combining academic depth with industry-oriented work, industrial PhD students contribute to long-term knowledge exchange. They bring real-world challenges from companies into research environments and translate academic knowledge into practical benefits. This report is primarily based on interviews with representatives from academia and industry and a survey answered by industrial PhD students in Sweden. The findings show that industrial PhD projects strengthen collaboration, enable relevant research, and provide companies with access to cutting-edge expertise. The PhD students themselves highlight personal development, the opportunity to combine work with research, and the acquisition of specialist skills as key motivators.

Despite the clear advantages, challenges remain. Collaboration is often initiated informally, indicating a need for clearer structures and meeting platforms. Small and medium-sized enterprises are underrepresented, even though it is not necessary to have a large research and development department. An active research interest is sufficient to participate in industrial PhD projects. Furthermore, third party funding is crucial to enable industrial PhD projects, especially for smaller actors. Research programmes play a dual role here – both as funders and as collaboration platforms.

Industrial PhD projects also involve a complex balancing act between academic requirements and business needs. PhD students describe challenges related to time management, workload, and unclear roles. The importance of clear agreements, mutual understanding, and structured communication is emphasised by both academia and industry. Issues such as publication rights, confidentiality, and intellectual property are generally handled through agreements, but the need for standardisation remains.

All interviewed stakeholders agree that the benefits of industrial PhD projects outweigh the challenges.

Skills Provision and the Integration of International PhD Students

Skills provision and career pathways are additional key issues. Companies express uncertainty about whether industrial PhD students will remain at the company after graduation, a concern amplified by limited salary progression and unclear career opportunities. To retain talent, support structures are needed – especially for international industrial PhD students, who often face challenges related to work permits, integration, and housing. To attract more international industrial PhD students, there is a need for increased funding, changed migration regulations, and simplified administrative processes. At the same time, data shows that a majority of international PhD students wish to stay in Sweden after graduation, making it even more important to create good conditions for them to settle into life in Sweden.

Another measure to strengthen collaboration between academia and industry, while also supporting individual researchers in their future career path, is internships. Internships during the PhD period or postdoc phase appear to be a strategic tool for enhancing integration and retaining international talent. Internships provide researchers with concrete insights and contacts into the Swedish labour market and improve their chances of staying in Sweden. Despite this, structured internship programmes for researchers are lacking in Sweden. International examples show that internships can serve as effective recruitment tools, and Swedish initiatives such as the *Internship Programme* run by Karolinska Institutet demonstrate that there is potential to build upon.

Paths Forward – Six Key Areas for Strengthened Collaboration

To stimulate continued development of these collaborative models, coordinated efforts are needed in six key areas:

Increased third party funding – to enable long-term initiatives.

Clearer structures and reduced administration – to simplify the establishment and maintenance of collaboration.

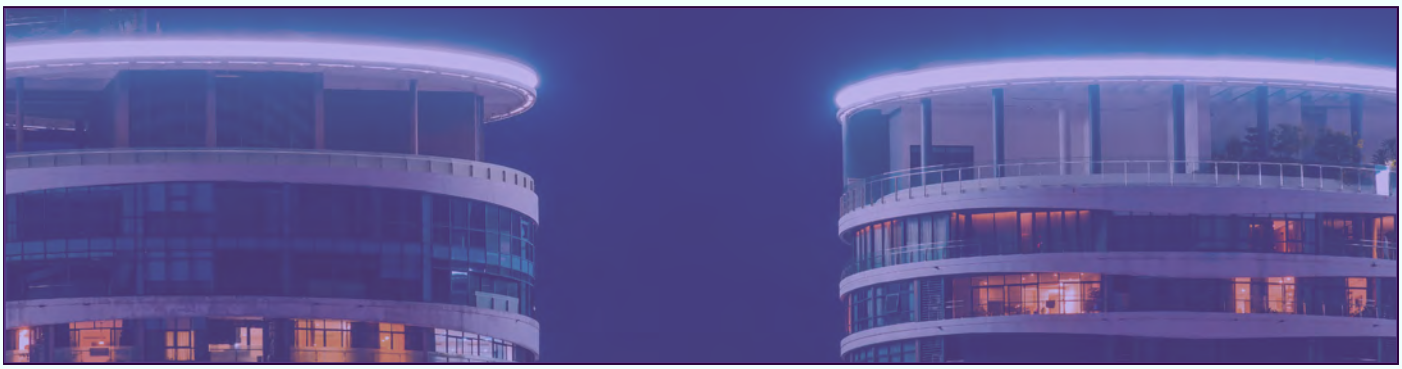
Increased awareness and visibility – to inspire more stakeholders and boost interest.

Improved financial conditions and career pathways – to retain and attract talent.

Structured and long-term collaboration – between academia and industry.

Development of internship programmes – as a concrete tool for integration and skills provision.

By addressing these factors, industrial PhD students and international talents can continue to strengthen Sweden's competitiveness, innovation capacity, and role as a leading knowledge nation.



Background

Collaboration as a Cornerstone for Innovation and Societal Development

As highlighted in the Draghi report, *The Future of European Competitiveness, Part B*, European Union, 2024 14, *"The links between higher education and business are weak and researchers have few incentives to become entrepreneurs."* Reasons cited include low awareness of the positive effects of collaboration and insufficient support at universities regarding the commercialisation of research.

Sweden has a strong tradition of collaboration between academia and industry. Through continuous and mutual exchange of knowledge, these actors have jointly addressed complex societal challenges and contributed solutions that strengthen both innovation capacity and competitiveness. In addition to offering education and conducting research, universities are also tasked with engaging with the surrounding society and ensuring that research results are put to practical use. In this sense, collaboration between academia and industry is not only desirable, but also an integral part of the mission of higher education institutions.

The Swedish Higher Education Act (Högskolelagen)[8] states: ***"The mission of higher education institutions shall include collaboration with the surrounding community for mutual exchange and to ensure that the knowledge and expertise available at the institution benefit society".***

The collaboration mission of universities takes many forms: research partnerships, degree projects, popular science lectures, innovation initiatives, and much more. Another significant form of collaboration is industrial PhD students – PhD candidates who are employed by a company while also being admitted to PhD studies at a university. This model creates a direct link between academic research and practical application, helping to build bridges between theory and reality.

Industrial PhD Students – A Strategic Bridge Between Academia and Industry

In the Swedish government's bill 2024/25:60 on *Research and innovation for the future, curiosity and benefit (Forskning och innovation för framtid, nyfikenhet och nytta)*[15], the importance of industrial PhD students is emphasised:

"PhD candidates employed outside the university, so-called industrial PhD students, play an important role as a bridge between academia and the wider world. Research is enriched by the industrial PhD students' knowledge of the conditions in industry and other sectors, and employers benefit from gaining access to current research. Both large and small to medium-sized enterprises, public authorities, and other actors in the public sector and research institutes have an interest in hosting industrial PhD students"

At the same time, Sweden faces challenges in securing competence within research and development. According to the Royal Swedish Academy of Engineering Sciences' (Kungliga Vetenskapsakademin) *Research Barometer FoU-barometern 2024*[2], access to the right expertise is the most important factor in determining where companies choose to locate their research and development (R&D) activities. Despite this, the report *The PhD Crisis – A Threat to Sweden's Prosperity*[1], shows that the number of PhD students has decreased by 5% since 2010. The report further reveals that the proportion of international PhD students relative to Swedish PhD students is increasing. In 2023, they accounted for 55 % of active PhD students in the field of technology, and as much as 59% of those who had just begun their PhD studies. Individuals with international backgrounds play a crucial role in maintaining the number of PhD students in Sweden.

International Expertise – The Key to Future Competitiveness

To address the challenge of securing talent for Swedish industry, the government has outlined a goal in *Sveriges Industristrategi (Industrial Strategy of Sweden)* 2025[17] to *"strengthen Sweden's position in attracting and retaining international top-level expertise demanded by the labor market."* A concrete example is the coordination of the *Work in Sweden* initiative by the Swedish Agency for Economic and Regional Growth (Tillväxtverket)[5], which since 2024 has been run in collaboration with nine other government agencies and Business Sweden. The aim is to improve coordination around Sweden's ability to attract highly qualified international professionals, thereby strengthening Sweden as a knowledge nation. Also the Swedish Institute (Svenska Institutet)[12] has since the beginning of 2025 had an extended mission in attracting highly skilled international talent to Sweden.

There are several strategic approaches to attracting and retaining international talent. Recruitment can take place directly from abroad, but also by creating opportunities for international students already in Sweden to stay after completing their studies. One underutilised opportunity is to offer young researchers a stronger connection to the Swedish labour market – for example, as industrial PhD students or by doing internships at a company during their time at Swedish universities. By creating clear and attractive career paths, Sweden can both attract and retain top-level expertise.

However, for this to succeed, academia, businesses, and society must adapt to a more international audience. International researchers often face both practical and emotional barriers when establishing themselves in the Swedish labour market. The report Can Sweden Afford to Lose Them?[9] from EURAXESS Sweden highlights factors such as limited language skills, a lack of understanding of Swedish culture, and migration-related challenges as contributing to difficulties in integration.

At the same time, the *Talent Map Report*[10], developed by Switch to Sweden (run by Linköping Science Park), shows that Swedish companies are generally positive toward international recruitment. Despite this, many international candidates feel they are often overlooked in recruitment processes, indicating a gap between ambition and reality. This raises an important question:

Could more opportunities for international young researchers – either as industrial PhD students or interns – help bridge this gap and thereby contribute to securing Sweden's future competitiveness?

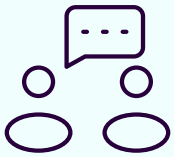
Approach & Scope

The project aims to explore how the number of international* industrial PhD students can be increased, as well as to map opportunities for internships for international PhD students and postdocs. As explained in the introduction, the study focuses on international industrial PhD students, but it was identified early on that many of the challenges affecting the broader group of industrial PhD students are also relevant to international candidates. Therefore, the report includes these aspects as well.

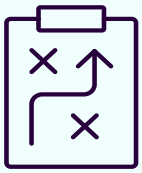
Most PhD students in Sweden are affiliated with universities**, but some are employed by companies or organisations conducting research. These individuals are sometimes referred to as company-based or collaborative PhD students, but in this report, the term industrial PhD student is used.

Data collection was carried out in collaboration with Verian (formerly Sifo) and includes both qualitative and quantitative methods. The qualitative part consists of 44 semi-structured interviews: 26 with academic representatives such as professors, supervisors, and directors of research studies, and 18 with representatives from industry, including technical managers, heads of research, engineers and CEOs, in fields such as engineering, biomedicine, and technology. The represented companies vary in size and may or may not have their own research departments. These interviews provided in-depth insights into experiences, perspectives, and challenges related to collaboration through industrial PhD students.

The quantitative data were collected via a survey targeted at industrial PhD students. The survey was completed by 203 respondents, of which 188 (92.6%) were industrial PhD students. Only these respondents received follow-up questions regarding their role as industrial PhD students, and their responses therefore form the basis of the survey results. The remaining responses were filtered out. In total, 46 (29.5%) of the respondents identify themselves as international.



44 interviews
26 from academia
18 from industry



Quantitative survey

The survey was distributed as an open link to Swedish higher education institutions, which means the exact response rate cannot be determined. Verian has accounted for the risk of duplicate responses during data processing. The quantitative data enables a broad mapping of patterns and trends within the target group and strengthens the generalisability of the analysis.

The issue of internships for international early-career researchers is addressed separately in the report. The basis for this section includes the semi-structured interviews as well as national and international benchmarking.

The combination of qualitative and quantitative methods has contributed to a comprehensive picture of both individual experiences and structural conditions, providing a more complete understanding of collaboration through industrial PhD and internships students, with a particular focus on international aspects.

*In this report, international refers to individuals who have come to Sweden in recent years to study or work.

** In this report, when we refer to universities, we include all higher education institutions in Sweden, both universities (*universitet*) and university colleges (*högskolor*).

Collaboration through Industrial PhD Students

According to *Rättsliga hinder mot samverkan? Juridik och ledningsfrågor vid doktorandsamverkan (Legal Barriers to Collaboration?* Legal and Governance Issues in PhD Collaborations), Strand, M., Wedlin, L. & B Schön, T., SNS Förlag, 2025[7], collaboration between academia and industry is essential for the collective advancement of knowledge in society. Through such collaboration, both parties can strengthen their ability to contribute to addressing society's long-term challenges,

A common form of collaboration between academia and industry occurs within PhD education. The majority of those pursuing PhD studies in Sweden hold a PhD position at a university. Some, however, are employed outside the university and conduct their PhD studies in collaboration with a company or another external actor – these are referred to as industrial PhD students *(Legal Barriers to Collaboration. Legal and Governance issues in PhD Collaboration).*[7]

The Perspective of Academia and Industry – Results from a Qualitative Study

In this section, we will present the results from qualitative interviews with representatives from academia and industry.

Strategic Purposes of Industrial PhD Projects

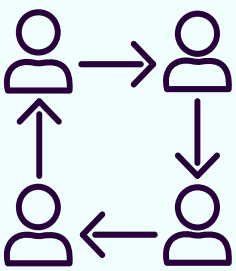
Our findings indicate that collaboration between academia and industry through industrial PhD students is perceived as a strategic and mutually valuable exchange of knowledge. The industrial PhD student acts as a bridge between research and society, providing academia with access to concrete, industry-relevant research questions, while industry gains insights into the latest academic research. This form of collaboration helps align research more closely with real societal challenges, while companies benefit from enhanced competence and long-term innovation capacity. As one professor in academia noted,

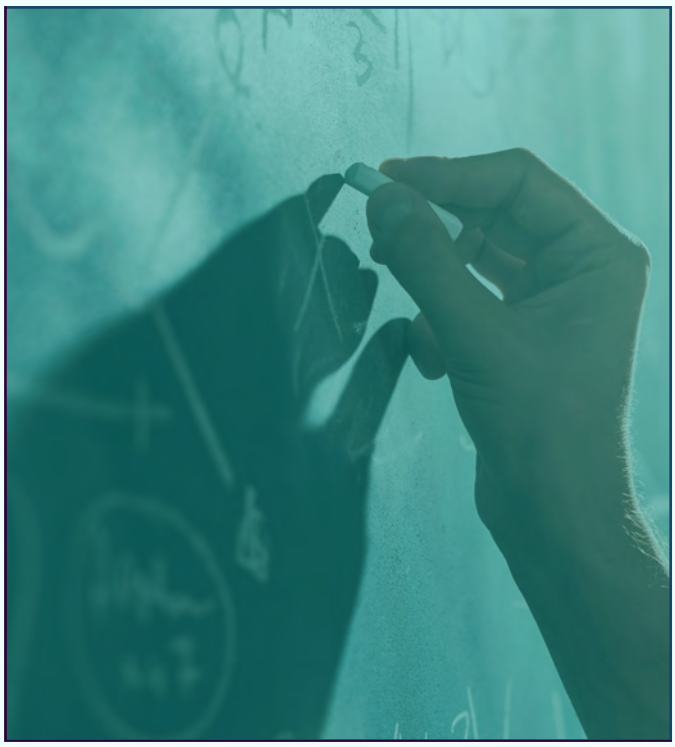
"The goal is to build a bridge between academia and industry to enable more effective knowledge exchange. Industrial PhD students play a key role in this by bringing industry problems into academia and vice versa."

Interviews with representatives from both academia and industry show that industrial PhD students are an established form of collaboration. Nearly all interviewees have experience with industrial PhD students at their institutions or companies. For academia, the primary purpose of hosting industrial PhD students is to gain access to relevant and current research questions that can be translated into practically meaningful research. Access to research infrastructure, such as equipment or facilities not otherwise available at the universities, is also mentioned.

For industry, the collaboration is mainly about competence development and research support. Through industrial PhD students, companies gain access to human research capacity and expertise that can contribute to their development. According to most companies interviewed, the goal is not for the PhD student to deliver a patentable invention or system solution. However, this may be a positive side effect, but the main purpose is rather to gain access to the latest research. The idea is that this knowledge will yield long-term returns for the company. As an industry representative underscored,

”The purpose is to stay at the forefront of knowledge areas that are strategically important to us. Industrial PhD students help us build long-term knowledge that is vital for our competitiveness.”





Pathways into Collaboration – From Initial Contact to Project

In most cases, the collaboration process involving an industrial PhD student does not begin through a formalised and structured procedure, but rather through an informal process based on personal contacts and networks. This is reported by most interviewees from both academia and industry. Typically, the process starts with informal discussions between individuals in academia and industry who know each other or have had prior contact. The initial outreach can come from either side, but most commonly, it is industry that initiates contact with academia. Several interviewees emphasised the importance of informal contacts and networks in enabling industrial PhD projects to begin.

Only a few interviewees from academia and industry did not have an industrial PhD student employed or enrolled at the time of the interview. However, all academic representatives expressed a positive attitude toward industrial PhD students. Among the companies that did not have an industrial PhD student, a common reason was a lack of knowledge about what collaboration through an industrial PhD would entail, where they should turn to find a candidate, and how the process works. As stated by a CEO in industry,

”Different companies are in various phases and have different needs. Still, when the time comes, there must be clear information about the process and what steps are needed to establish an industrial PhD position.”

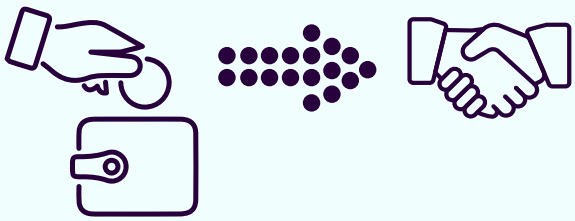
Regarding companies’ research activities, it was found that having a large research department is not a requirement for hosting an industrial PhD student. However, an active interest in research within the company is essential. It is especially valuable if there are individuals with a research background who understand what it means to host an industrial PhD student and who see the potential in collaborating with academia. Such understanding helps create favourable conditions for the project’s implementation and outcomes.

The Importance of Funding for Collaboration

Most academic interviewees stated that industrial PhD students are usually funded through a third party (neither industry nor academia). When such funding is not available, the company typically covers most of the costs, including compensation for supervision during the PhD education period. Among the companies interviewed, third party funding was the most common model. While some companies do finance PhD students themselves, this is relatively rare. Third party funding is particularly highlighted as a crucial factor for smaller companies, where it is often a prerequisite for participating in industrial PhD projects. As noted by an industry manager,

”External funding is essential because it covers a significant portion of the cost. It’s a long-term investment that doesn’t always yield immediate returns.”

Good examples of how funding can encourage collaboration between academia and industry through industrial PhD students include the Knut and Alice Wallenberg Foundation (KAW), which funds the WASP and WISE research programmes, and the Knowledge Foundation (KK-stiftelsen), which funds the *Industry Research Schools (Företagsforskarskolor)* programme, enabling universities to run graduate schools for industrial PhD students.



Challenges in Collaboration Through Industrial PhD Students

One of the most frequently mentioned challenges by academic representatives concerns the balance between work and study. Industrial PhD students are expected to contribute to the company’s operations while simultaneously conducting research as part of their education, which can be challenging to manage. In some cases, this has led to extended study periods, and in rare instances, students have had to discontinue their studies. A related risk is that the PhD student may be perceived as a subsidised resource rather than a research student, which can negatively affect both workload and research focus. It is also emphasised that industrial PhD students must be allowed to engage in an academic environment during their education and not only be based at the company.

This is crucial to ensure research quality and academic progress. As one professor in academia noted,

”One challenge is balancing the PhD student’s time between the company and the PhD education. It is essential to establish clear agreements regulating this.”

Challenges from the companies’ perspective vary depending on company size, experience with academic collaboration, and internal structures. Some companies report lacking established collaboration models, while others see challenges in the long duration of studies or insufficient supervision from academia. Another aspect raised is the uncertainty about whether the PhD student will remain with the company after graduation. Although not seen as a problem by all, many emphasise the importance of retaining the competence developed during the PhD period.

A recurring challenge is the need for alignment between academia and industry. Differences in goals and expectations can create friction, both in ongoing collaboration and in the initial phase when the research question is formulated. Establishing a shared understanding of the project’s purpose and conditions is therefore essential for successful cooperation. As a senior industry representative put it,

”It is also important that the company and academia understand each other’s drivers and conditions.”

Contractual Issues: Publication, Confidentiality, and Intellectual Property

A recurring issue in collaboration between academia and industry concerns the balance between the industrial PhD student’s right to publish research results and the company’s need to protect confidential information and intellectual property (IP). For companies, publishing sensitive data or innovative solutions may pose financial risks. As one manager in the industry noted,

” For a company with limited experience in collaborating through industrial PhD students, this can be a challenge – especially if they are unfamiliar with university regulations.”

Most interviewees, from both academia and industry, stress the importance of addressing these issues early in the process and regulating them in agreements between the parties. Solutions vary: some companies reserve the right to delay publication, while others want to review results before publication. Confidential information is typically regulated through specific non-disclosure agreements. Several interviewees also highlight the importance of selecting research projects from the outset, where the risk of conflict over confidentiality and IP is limited. While challenges exist, most interviewees feel these can be managed through clear communication and well-designed contracts.

Contractual issues are an area where both academia and industry see potential challenges. The extent to which these are perceived as problematic often depends on how structured and standardised the process is, as well as the parties’ previous experience with industrial PhD projects. Academic representatives report that contract negotiations usually take place with support from the university’s legal department, and that solutions are often found, even if the process sometimes requires extended negotiations. Several academic interviewees express a need to standardise procedures and agreements across Swedish higher education institutions, both to facilitate collaboration and to avoid competition between institutions.

Another challenge raised by several interviewees is what happens if the industrial PhD student is forced to discontinue their studies, for example, due to company bankruptcy or termination of the collaboration. In such cases, there may be uncertainty about who bears continued responsibility for the student.

Finally, interviewees who currently have or have had industrial PhD students were asked whether the benefits outweigh the drawbacks.

All respondents agree that the benefits do indeed outweigh the challenges.

Conditions for Increasing the Number of Industrial PhD Students

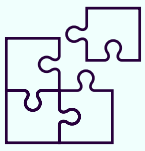
The majority of interviewees from both academia and industry emphasise the importance of securing sufficient funding from third parties to ensure that collaboration through industrial PhD students can continue and evolve. External research programmes, are highlighted as crucial enablers for investments in industrial PhD students, both for large and small companies. When asked how the number of industrial PhD students could be increased, funding opportunities were the most frequently mentioned factor.

Research programmes are seen not only as an important source of funding but also as successful examples of collaboration structures. They have helped establish clearer processes for industrial PhD projects and facilitated networking among involved parties.

Beyond funding, both academia and industry stress the need to spread more knowledge about what it means to be an industrial PhD student, the purpose of collaboration, and how to apply for funding.

Suggestions included matchmaking events to connect academia and industry. Several respondents also stressed the importance of highlighting success stories to increase interest among potential industrial PhD candidates and companies. As one professor in academia remarked,

”We need to talk about all the successes we’ve already had. Make the positive examples more visible.”



Within academia, there is also a need to reduce administrative burdens. The process of establishing collaboration and admitting an industrial PhD student is described as time-consuming and often unclear. Agreements may contain ambiguities that require extensive legal discussions between the university and the company.

To simplify and clarify the process, more collaborative projects with well-defined frameworks, similar to those within established research programmes, are suggested.

From the companies' perspective, funding from third parties is the most critical factor for being able to host industrial PhD students. Several interviewees stressed that funding should cover the entire study period to ensure long-term stability and predictability. As a manager from the industry stressed,

[…] we rely on external funding. We wouldn't have an industrial PhD student without it.

In summary, increasing the number of industrial PhD students requires both increased funding and improved understanding of what collaboration entails. Clearer processes, reduced administrative burden, and better communication about the benefits of industrial PhD students are key factors for enabling continued development.

International Industrial PhD Students – Opportunities and Challenges

When it comes to international industrial PhD students, particular opportunities and challenges also become apparent. A general view, emerging from the interviews, is that both academia and industry have a positive impression of hosting international industrial PhD students. For many, international individuals already make up a significant portion of students and staff, and the challenges faced by this international PhD students are mainly similar to those encountered by industrial PhD students in general.

However, within academia, when specific challenges related to international status arise, they often concern the same issues faced by international students and researchers more broadly.

For example, many international students and researchers experience challenges related to visas and residence permits. Several interviewees mentioned that international PhD students are sometimes granted residence permits only for the expected duration of their studies, which can cause problems if the studies need to be extended. In some cases, obtaining a residence permit at all can be difficult, especially for individuals from countries subject to heightened security assessments. The global security situation thus affects the ability of possible international industrial PhD students to come to Sweden.

These challenges were clearly articulated by the Vice Chancellor of a Swedish higher education institution:

"International collaboration is becoming increasingly complex due to security aspects and the need for risk assessments. There may be issues with transparency regarding what other companies are doing and the connections between different firms, which can affect the risk profile."

From the companies' side, there is some uncertainty about whether international industrial PhD students will remain in Sweden after graduation. The need to provide support and actively work with inclusion and integration is highlighted as important to increase the chances of retaining this competence in the country.

Some interviewees also noted that Swedish universities may struggle to compete with large international institutions in attracting international industrial PhD students, which presents an additional challenge. Several respondents therefore stressed the importance of spreading information about the benefits of being an industrial PhD student in Sweden and how international candidates can pursue such a path. This is seen as a way to increase the number of international industrial PhD students and to strengthen Sweden as a knowledge nation. As highlighted by a CTO in the industry,

"It's a combination of visibility, location, and marketing. Sweden as a country should have a strategy to attract people here."

It is a combination of visibility, location and marketing. Sweden as a country should have a strategy to attract people to Sweden (CTO in business).

The Perspective of Industrial PhD Students – Results from a Quantitative Survey

In this section, we will present the results from the quantitative survey conducted by industrial PhD students.

Who are the Respondents?

Among the respondents, 38.8% were women and 57.4% were men 46 (29.5%) of the respondents identify themselves as international. The survey was answered by industrial PhD students from 13 Swedish universities, with the majority coming from the Royal Institute of Technology (KTH) at 28.6%, followed by Chalmers University of Technology (CTH) at 22.5%.

The respondents represent a wide range of research disciplines, with a clear dominance in technology (61.9%). This is followed by medicine/life sciences (18.2%) and natural sciences (14.9%). Regarding the business sectors where the PhD students are/were employed, the IT sector is the most represented at 29.8%. This is followed by transport and medicine/health, both at 16.3%. Other sectors also have a significant presence, such as telecom/electronics (11.8%), materials/nanotechnology (11.8%), energy/environment

Respondents:

Women **38,8%**

Men **57,4%**

Universities:

KTH **28,6%**

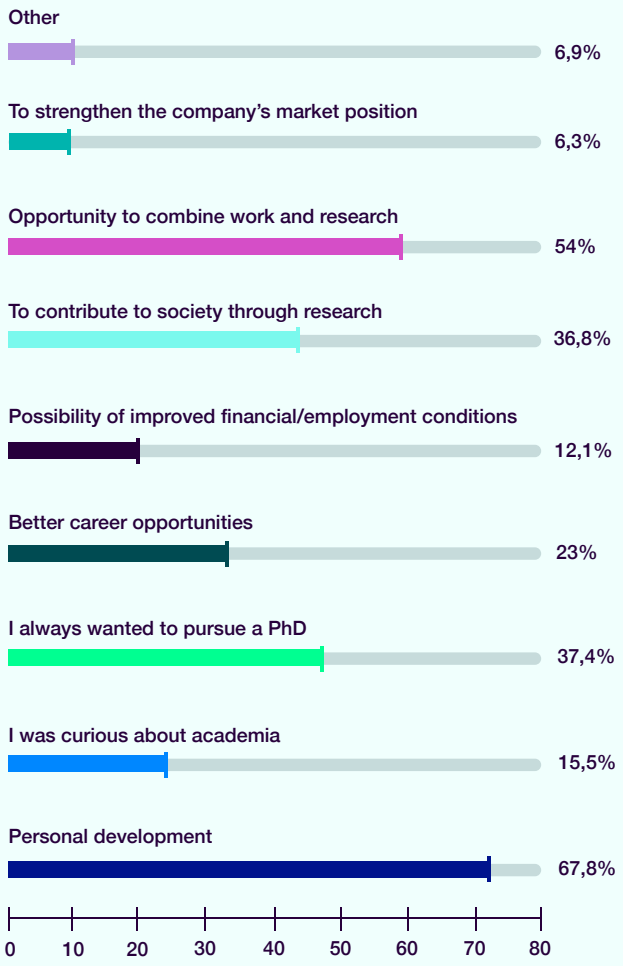
Chalmers **22,5%**

Overall Insights from the Industrial PhD Students

The following section presents insights from the survey regarding the group of industrial PhD students as a whole. In cases where specific responses from international industrial PhD students stand out, this is highlighted in the text.

The driving force behind becoming an industrial PhD student

(Option to select 1-3 alternatives)



The primary motivation given for becoming an industrial PhD student is personal development, as stated by 67.8% of the respondents. The second most common reason is the opportunity to combine work with research (54%). These drivers are also reflected among international industrial PhD students, where a larger proportion report that they have always had the ambition to pursue a PhD, 47.8%, compared to 31.8% among domestic respondents.

This ambition is clearly illustrated in one of the open-ended responses from a participant:

"I already worked with research and loved it, so I wanted to keep doing research but better."

Less common response options include the desire to strengthen the company's market position and to improve one's financial situation. This suggests that market-driven and financial factors play a more limited role.

Who initiates the industrial PhD project?

Regarding whom initiated the industrial PhD project, the company is most often the driving force. A total of 44.3% of respondents stated that the initiative came from the company, while 40.8% took the step themselves. Only 14.9% indicated that the initiative came from the university.

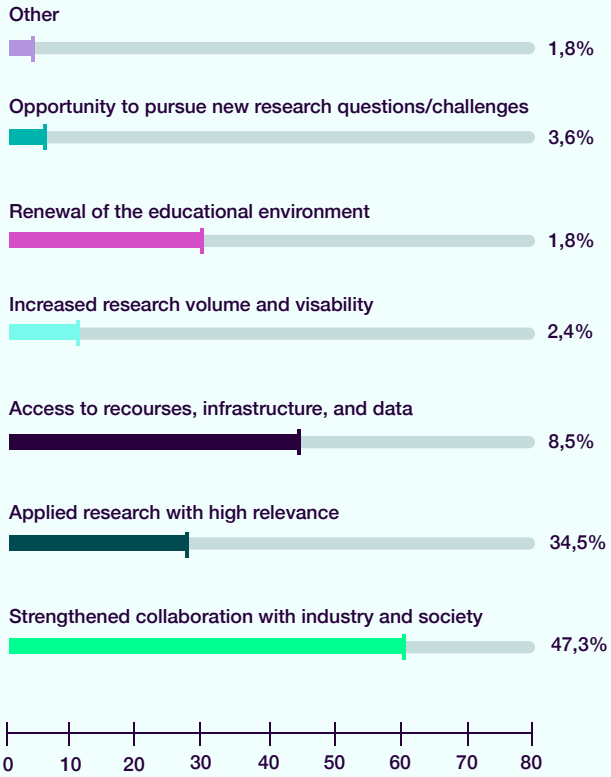
Opportunities through Collaboration via Industrial PhD Students

What do you see as the greatest benefits or advantages of being an industrial PhD student? First mentioned.

(Rank 1-3)

The main advantages of being an industrial PhD student are the opportunity to acquire specialist expertise, the ability to combine academia and industry, and personal development. However, aspects such as an expanded professional network and a strengthened position within the workplace appear to have relatively low impact. This reinforces the view that personal interest in research and the collaborative nature of the industrial PhD model are the primary motivators for participation, rather than career-related or financial incentives.

What do you see as the greatest benefits or advantages for the university when collaborationg with industry through an industrial PhD? First mentioned.
(Rank 1-3)



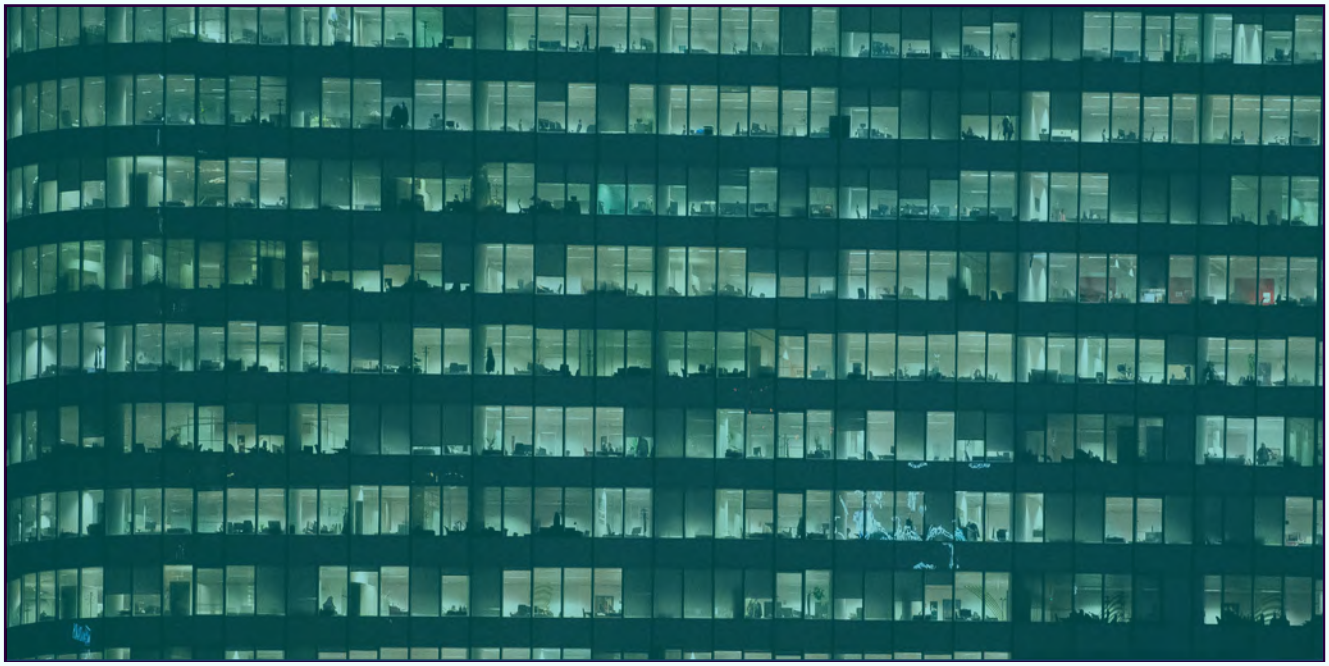
When it comes to the benefits of industrial PhD collaborations, for higher education institutions, most respondents (47,3%) believe that strengthened collaboration between industry and society is the main benefit. Next, the opportunity for relevant and applicable research is emphasised as an important advantage (34.5%). Both aspects also frequently appear as second and third choices among the respondents.

What do you see as the greatest benefits or advantages for the company having you as an industrial PhD student? First mentioned.

(Rank 1-3)

In terms of the benefits of industrial PhD collaborations for companies, respondents highlighted skills development for employees (25.9%), access to specialised expertise and leading-edge research (25.9%), and the opportunity to engage in research that drives innovation and competitiveness (22.2%). These options also frequently appear as second and third choices, highlighting their significance.

An interesting difference emerges when comparing the overall group with international industrial PhD candidates, particularly regarding the options of employee skills development and cost-effective access to advanced research. While skills development is ranked as the top benefit by 25.9% of the total group, the corresponding figure among international industrial PhD candidates is only 10.9%. On the other hand, 19.6% of the international respondents state that cost-effective research is the most significant advantage, compared to 9.9% in the overall group.



Challenges of Collaboration through Industrial PhD Candidates

What do you see as the three greatest challenges of being an industrial PhD student? First mentioned.

(Rank 1-3)

The main challenges for individuals in their role as industrial PhD candidates are balancing expectations from both the company and academia (36.3%), lack of time and a double workload (21.7%), and unclear roles and expectations (16.6%). These three factors are among the six most common response options, regardless of whether they were ranked as first, second, or third priority.

What do you see as the three greatest challenges for the university when collaborationg with industry through an industrial PhD? First mentioned.

(Rank 1-3)

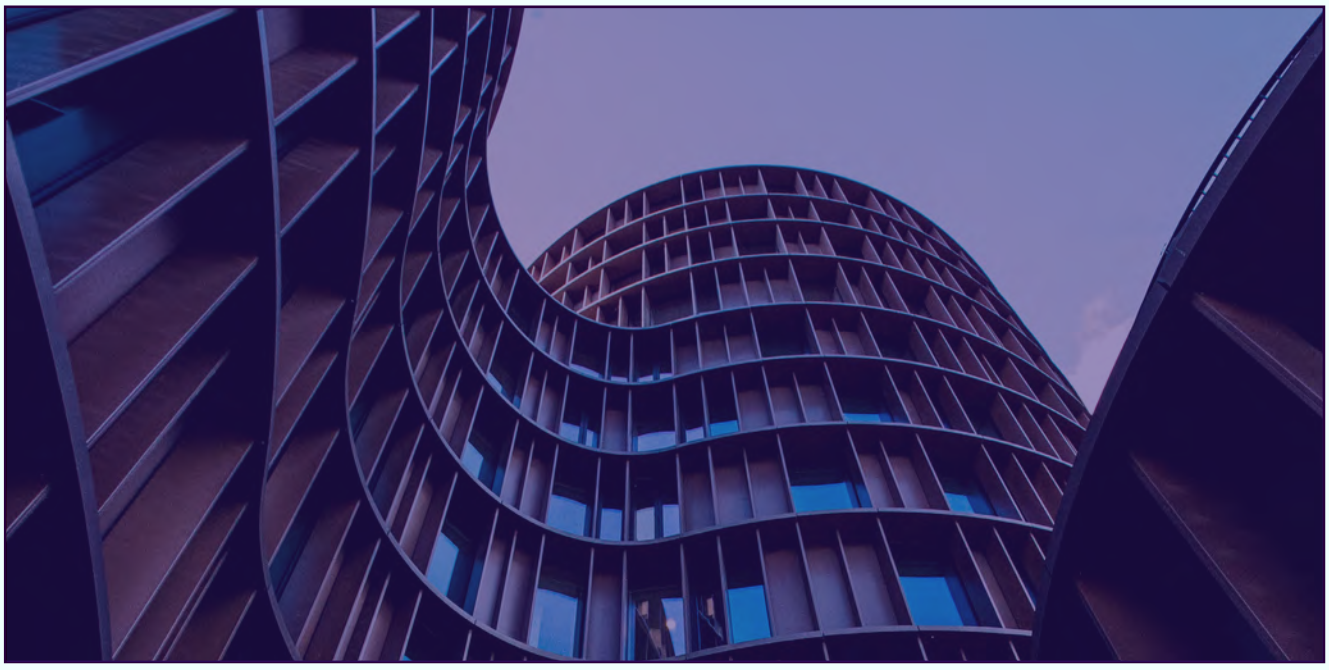
The main challenges that respondents believe universities face in industrial PhD collaborations primarily concern balancing academic culture with corporate interests (32.1%) and integrating industrial PhD candidates into the existing research environment (26.9%). These aspects are also frequently mentioned as second and third choices, underscoring their significance.

What do you see as the three greatest challenges for the company when collaborationg with industry through an industrial PhD? First mentioned.

(Rank 1-3)

When it comes to the challenges experienced by companies, they are identified to be balancing business interests with academic culture (26.9%) and long timelines with uncertain return on investment (26.3%). These options also frequently appear as second and third choices.

International industrial PhD candidates report that legal issues, such as intellectual property rights, pose a challenge to a significantly greater extent than the respondents in total. This option is the second most common first choice within this group, at 17.4%, compared to 9% in the overall group. It is also evident that international PhD candidates more often perceive confidentiality and IP-related issues as more challenging than what is generally experienced by the broader group.



Challenges in balancing roles also appear in the open-ended responses provided by survey participants:

*”**Stress** — it’s not uncommon to run out of time and not finish on schedule, but my company has a hard time understanding that. My supervisors at the university consider this a non-issue, but my company is upset that it’s taking longer. I find myself caught between these two worlds.”*

”Loneliness without clear coherence to either workplace.”

Ways Forward – Addressing the Challenges

Respondents were also asked to reflect on how they believe the identified challenges can best be addressed, considering all involved parties. The following overarching themes emerged from their responses:

- **Improved communication**

Several respondents emphasised the importance of more transparent and more structured communication between stakeholders. This includes establishing clear contracts and shared expectations from the outset.

- **Strengthened collaboration and partnerships**

The importance of building trust-based relationships and clarifying each party's responsibilities was frequently mentioned. Suggestions include more standardised agreements on publishing and increased interaction between universities and companies.

- **Increased knowledge and understanding**

Respondents highlighted the need to raise awareness within academia about confidentiality issues and the specific nature of industrial PhD work. This also involves educating business leaders on the long-term benefits of engaging in PhD projects.

- **Clear roles and division of responsibilities**

A clear definition of roles and responsibilities between academia and industry is considered crucial. This includes setting realistic expectations and companies articulating a clear vision for their involvement.

- **Resources and funding**

To address the challenges, increased financial resources and more strategic prioritisation and allocation of financial means were suggested. One concrete measure mentioned is the development of a sustainable salary progression plan for industrial PhD candidates.

The Role of the Industrial PhD Candidate in Collaboration – Perceived Importance

The respondents were also asked to assess how important they believe industrial PhD candidates are for collaboration between academia and industry, on a scale from 1 to 5, where 1 indicates not at all important and 5 indicates very important. The data clearly shows that a large majority of respondents consider industrial PhD candidates important for collaboration between academia and industry. Only 3.8% chose a response below 3.

How Can the Number of Industrial PhD Candidates Increase?

Respondents were asked an open question about what they believe needs to be done to increase the number of industrial PhD candidates in Sweden. Several recurring themes emerged in their free-text responses:

- **Increased third party funding and financial support**

Many highlighted the need for expanded resources and financial support for industrial PhD projects. This includes grants that promote research collaboration between academia and industry, funding for practice-oriented projects, and increased public funding for this type of initiative.

- **Improved financial conditions and salaries**

Several respondents stressed the importance of offering competitive salaries and clear career paths for industrial PhD candidates, even though it was not considered the top driving force behind becoming an industrial PhD student. For example, a clear salary premium for a PhD degree, especially for engineers, could serve as a strong incentive.

- **Strengthened collaboration between academia and industry**

A recurring theme is the need for closer and more structured collaboration between academic institutions and industry. Suggestions include more industry-driven projects, increased support for collaboration initiatives, and greater integration of industrial perspectives within academia.

- **Increased visibility and awareness**

Many pointed to the need to inform about the opportunities offered by industrial PhD projects. This involves more transparent communication about what an industrial PhD candidate is, what career opportunities exist, clarifying conditions, and actively marketing available positions – both within academia and to the business sector.

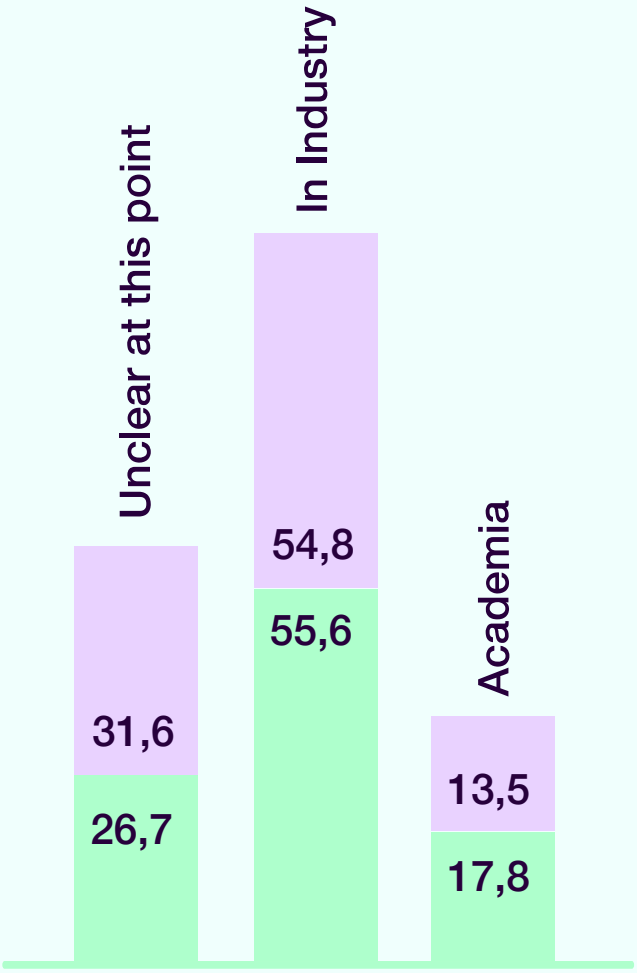
- **Simplified administration**

Finally, the need to reduce administrative burdens was emphasised. Suggestions include smoother application processes, clearer employment regulations, and simpler contract management between universities and companies.

Future Ambitions Among Industrial PhD Candidates

All respondents were asked to answer a question regarding their future ambitions.

How do you view the future? Do you have an ambition to continue in academia or in industry?



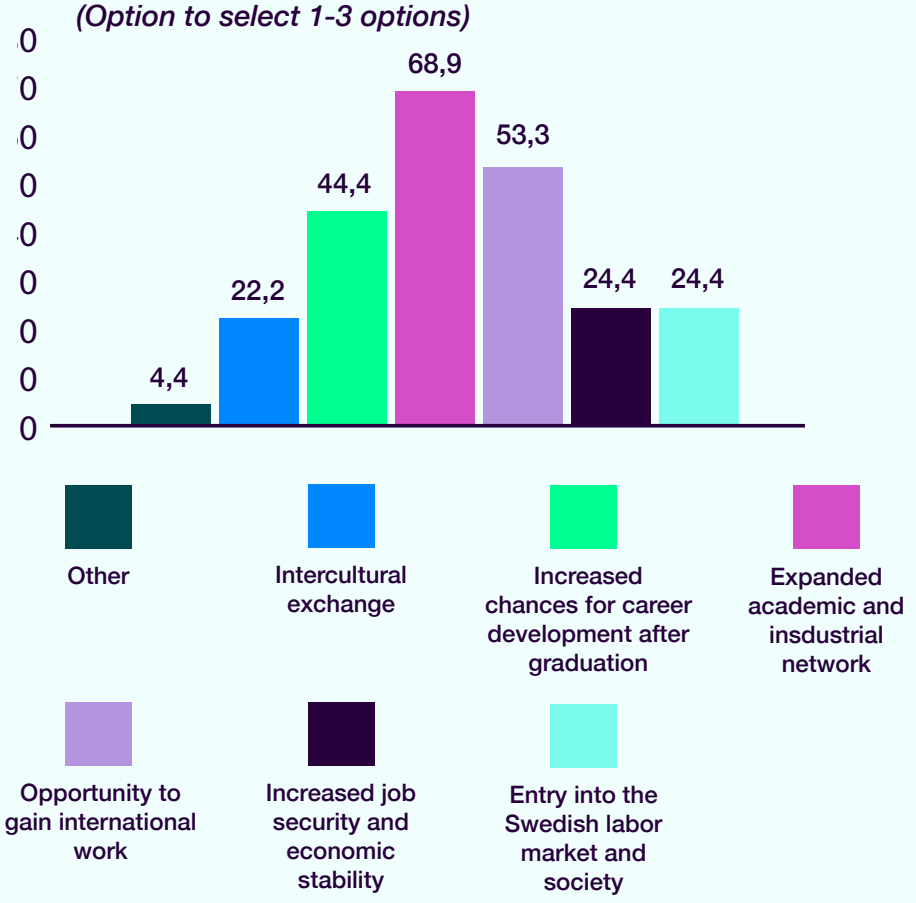
To summarise, it is clear that the majority of respondents intend to continue working in industry after completing their studies. At the same time, a noticeable proportion expresses uncertainty about their future career choices.

International Perspective

A total of 46 respondents, corresponding to 29.5% of the total number, identified themselves as international industrial PhD students. These participants were asked some additional questions specifically addressing their situation and experiences as international industrial PhD students.

As an international PhD candidate, have you experienced any specific opportunities or advantages?

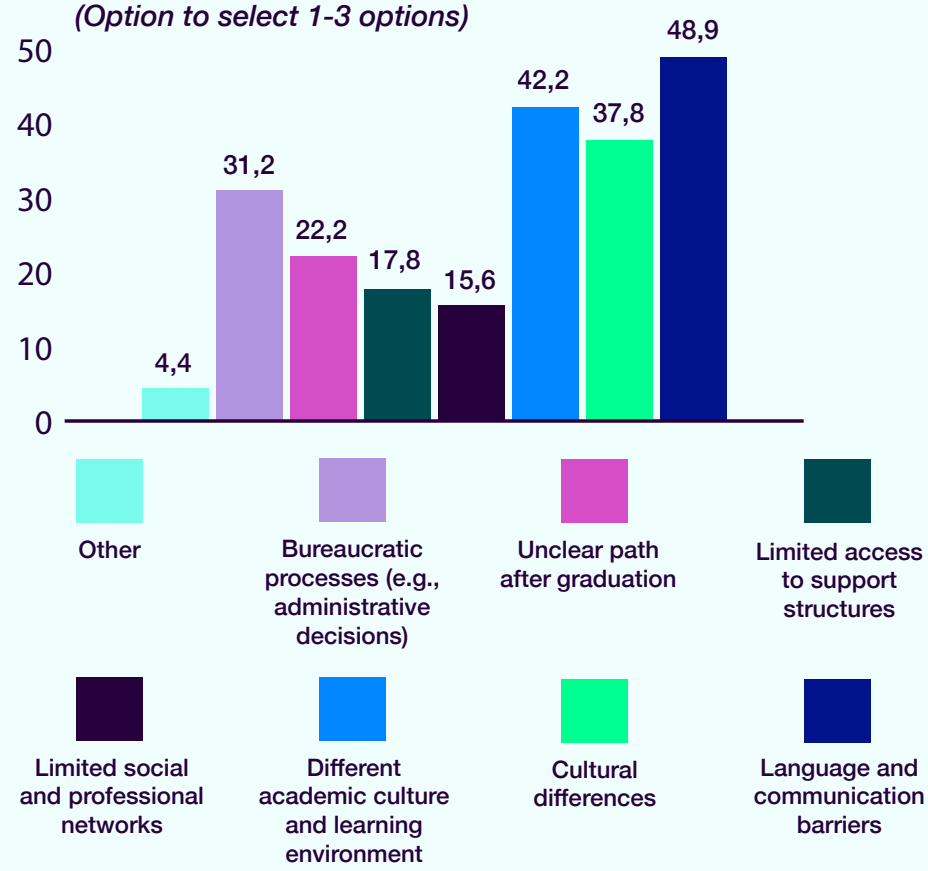
(Option to select 1-3 options)



The responses indicate that the main opportunities or advantages experienced by international industrial PhD students are networking (68,9%), followed by gaining international work experience (53,3%) and improved career prospects (44,4%). These factors are highlighted as the most significant benefits of working in a global industrial PhD environment.

As an international PhD candidate, have you experienced any specific challenges?

(Option to select 1-3 options)



The three most prominent challenges identified by international industrial PhD students themselves are: language and communication barriers (48.9%), differences in academic culture and learning environment (42.2%) and cultural differences (37.8%).

How can the number of international industrial PhD students be increased?

In an open-ended question, respondents were invited to share their thoughts on what could help attract more international industrial PhD students to Sweden. The answers revealed several recurring themes, with the following five areas standing out most clearly:

- **Funding**

Many respondents emphasised the need for increased funding as a crucial factor in attracting and supporting international industrial PhD students.

- **Work permits and immigration policy**

There is a clear desire for changes in work permit policies, such as the possibility of having multiple employers. Changes in the overall migration policy are also requested.

- **Visibility and communication**

To increase international interest, respondents stressed the importance of making industrial PhD opportunities more visible and actively promoting these openings in relevant international forums.

- **Cultural and linguistic integration**

Several respondents pointed to the need to facilitate integration, including offering English-speaking work environments, Swedish language courses, and intercultural communication training for staff.

- **Reduced bureaucracy and improved housing situation**

Finally, simplifying administrative processes and improving housing conditions were highlighted as essential steps to make Sweden more attractive to international PhD students.

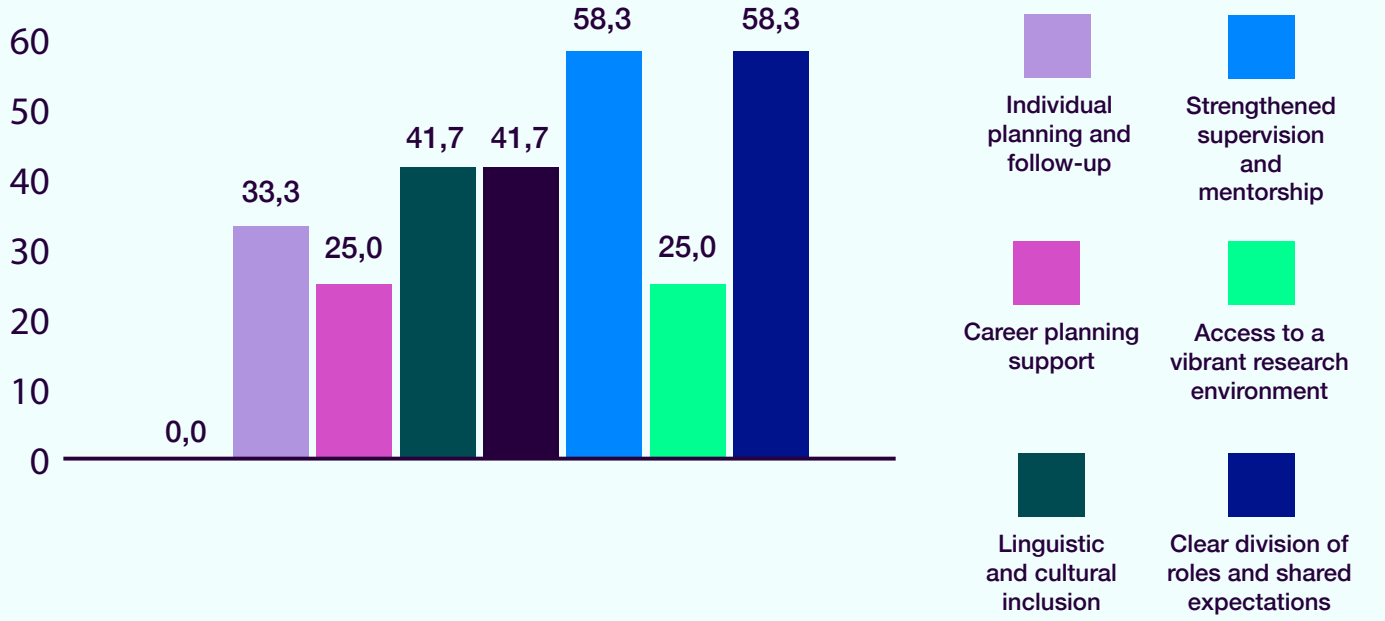
Evaluation of the PhD Period

Finally, international industrial PhD students were asked to evaluate their study period by rating it on a scale from 1 (very negative) to 10 (very positive). The results show that the majority experienced their time as industrial PhD students positively, with 73.3% giving a rating of 7 or higher. Only a few respondents gave a rating of 4 or lower.

For those who rated their experience as six or lower, a follow-up question was asked about what could have improved their study period. A total of 12 individuals, corresponding to 26.6% of the international industrial PhD students, responded to this question. A summary of their feedback is presented below.

What would have improved your experience?

(Option to select 1-3 options)



The two most frequently mentioned suggestions for improvement are: A clearer division of roles and shared expectations, as well as enhanced supervision and mentorship. Both were selected by 58.3% of respondents. These are followed by support in practical, legal, and administrative matters, as well as linguistic and cultural inclusion, both at 41.7%.

The emphasis on clearer roles and expectations aligns with previous observations regarding ambiguities and challenges in balancing academic and industrial demands.

Similarly, the need for language and cultural support, as well as assistance with administrative and legal matters, confirms earlier insights.

However, it is particularly interesting that enhanced supervision emerges as such a common area for improvement, while inadequate supervision has not been a recurring theme in other parts of the survey. One possible explanation is that the number of international industrial PhD students with negative experiences is relatively small. Still, those who have had such experiences often also report shortcomings in supervision.

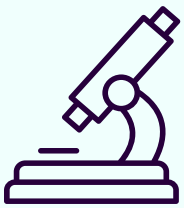
Internships for Researchers

– An Untapped Opportunity to Strengthen Collaboration

Collaboration between academia and industry through internships for PhD students and postdocs is relatively unexplored in Sweden. It could, however, be an opportunity to deepen the collaboration between the two sectors.

In addition to promoting increased understanding and cooperation between sectors, internships offer a valuable chance for personal and professional development for the researcher. At the same time, companies gain a concrete opportunity to explore what it's like to work with individuals with a research background.

In interviews conducted by Verian with representatives from both academia and industry, the topic of internships for researchers was raised. The majority of respondents viewed the development of such opportunities as a potential means of further strengthening collaboration. However, none of the interviewed companies had yet offered internships for researchers.



The opportunity for companies to easily explore what it's like to work with people with a research background

"Yes, internships are positive and can provide industrial experience"
(Head of Research, industry).

National benchmark

Internships for Researchers

As mentioned, not many universities in Sweden offer internships for researchers. One of the only (if not the only) university that currently offers internships for researchers is Karolinska Institutet. Below is an account of the structure and conditions that have made their programme successful for many years (interview conducted with Ana Oliveira Osorio, coordinator at KI Career Services).

Background of the Internship Programme at Karolinska Institutet

The internship programme was initiated after individuals at Karolinska Institutet noticed that many PhD students struggled to continue within academia after completing their dissertations. This could be due to anything from personal reasons to limited opportunities for an academic career, or funding. To address this need, the programme was launched with only four PhD students participating in the first round. Over the past twelve years, the programme has grown significantly – from four to a total of 80 available internship positions (for both PhD students and postdocs). Today, two application rounds are held per year, allowing more early-career researchers to explore career paths outside academia.

Application Process

The application process is structured and consists of several steps. It begins with a recruitment advertisement, often published via platforms such as Varbi. Participating companies then can present their internship opportunities through so-called *company pitches*. Each applicant can then apply to up to three different companies. The companies conduct interviews with the candidates and rank them based on suitability and interest.

Finally, a matching process takes place based on both the companies' and candidates' preferences and rankings, resulting in the final internship placements. Karolinska Institutet supports the interns' applications by providing three webinars twice a year during the timeline of the internship programme. The webinars are on the topics of how to present their transferable skills, how to prepare a CV adapted to industry and non-academic positions, and how to prepare for a non-academic interview.

Opportunities and Challenges

The programme offers several opportunities, primarily by opening valuable career paths outside the academic world. At the same time, there are challenges, especially in gaining supervisors' support for internship efforts early in the PhD student's education. It is generally easier to gain support for internships when the PhD student is nearing the end of their time at the university.

There are good opportunities to expand the programme, either nationally or regionally. An effective way to initiate such expansion is to conduct pilot projects, which can then be evaluated to identify success factors and areas for improvement.

Funding of the Programme

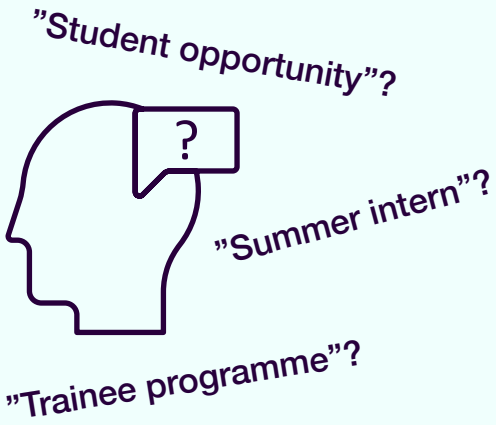
For example, so-called transition funds (*omställningsmedel*) are used to support the initiative. The PhD board covers the cost for 20 internship positions for PhD students, while the research board and trade unions fund internships for postdocs. Additionally, each participating company contributes SEK 60,000. A challenge in funding is that it is often allocated on an annual basis, which can create uncertainty regarding long-term planning.

Internships for Students

To enable a comparative analysis, data have been collected on internship opportunities for students at both undergraduate and advanced levels. The information has been gathered through a combination of systematic online searches and reviews of career pages of Swedish companies. The focus has been on organisations that clearly communicate internship programmes or research-related opportunities, including those that may potentially be relevant for early career researchers.

The results show that a significant number of Swedish companies offer internships for students at undergraduate and advanced levels. However, it is very unusual for internships to target researchers, such as PhD students and postdocs. It is more common for companies to use broad and unspecific terms such as *“student opportunities”*, *“summer internships”* or *“trainee programmes”*, without specifying the educational level intended. This creates a challenge for PhD students and postdocs to identify relevant opportunities and indicates a clear gap in industrial engagement for this target group.

The companies offering internships are mainly large multinational corporations. However, in addition to these, there is a smaller group of highly specialised companies operating in technologically advanced fields such as robotics, artificial intelligence and mobility/transportation. These actors tend to have a more research-oriented focus but rarely offer internships aimed explicitly at researchers.



International Benchmark

To gain a broader understanding of Sweden's potential to develop internship opportunities for researchers, an international benchmark has been conducted. A selection of organisations in other countries (both in Europe, Asia and North America) has been analysed to map the availability and structure of internship programmes for early-career researchers.

The analysis reveals several clear patterns:

- The reviewed organisations operate in globally strategic areas such as technology, consulting, finance and pharmaceuticals.
- In comparison to Sweden, many companies in other countries offer more developed and accessible internship programmes for PhD students and postdocs.
- The internship programmes are generally highly competitive and have a strong research focus. They aim to develop advanced skills in analysis, technology, and policy development, making them particularly relevant for early-career researchers.

Conclusions

The purpose of this report has been to explore how international industrial PhD students and internships for early career researchers can be strategically used to deepen the relationship between academia and industry. This study is important because it can help Sweden to better retain the highly skilled talents needed for the country to stay on top of innovation and knowledge creation.

Industrial PhD Students – A Key to Collaboration Between Academia and Industry

This report highlights that industrial PhD students play a central role in bridging the gap between academia and industry. By bringing industry challenges into academia and academic knowledge into industry, they contribute to a more effective and long-term sustainable exchange of knowledge. This is in line with insights from the report *Legal barriers to Collaboration? Legal and governance Issues in PhD Collaboration*[7].

The results of our collection clearly show that industrial PhD projects strengthen collaboration between academia and industry and create opportunities for relevant and applicable research. Competence development and access to expertise and cutting-edge research are also benefits highlighted by companies collaborating through industrial PhD students. The students themselves view their role as important for collaboration and cite several incentives for choosing this path. The most common motivation is personal development, followed by the opportunity to combine work with research and to acquire specialist knowledge. This demonstrates strong motivation and incentives from all parties to develop and strengthen this form of collaboration.

Initiating Collaboration

The survey shows that the initiative for industrial PhD projects often comes from companies or individuals. The fact that individuals take the lead can be linked to personal development as a strong incentive. At the same time, interviews reveal a knowledge gap within industry regarding industrial PhD students as a form of collaboration, which may explain why some companies are hesitant to engage. The students themselves emphasise the importance of increased awareness and understanding within both academia and industry. There is obviously a need for more information spreading about collaboration through industrial PhD students and to showcase the positive effects for all involved.

A majority of interviewees state that the collaboration process around industrial PhD students rarely begins through a formalised procedure. Instead, it often starts through informal contacts and personal networks, which underscores the importance of creating meeting arenas where academia and industry can interact.

Broadening Collaboration and Knowledge Transfer

Industrial PhD students are an established form of collaboration, and nearly all respondents have experience with having industrial PhD students in their organisations. However, it is primarily larger companies that are involved in such projects, while small and medium-sized companies are less active, even though a large R&D department is not a requirement for participation. The key is rather a strong interest in research. This indicates that more small companies could engage in industrial PhD projects. To make this possible, smaller organisations need to strengthen their awareness and understanding of such initiatives. Additionally, it's important to improve communication around the benefits of hosting industrial PhD students.

Knowledge transfer is also essential within academia, particularly between institutions with varying experience of industrial PhD students. According to *Legal Barriers to Collaboration? Legal and Governance Issues in PhD Collaboration*[7], different traditions and perspectives exist across universities, affecting the conditions for industrial PhD projects. Conflicts between collaboration and basic research may also arise. Cross-institutional discussions about responsibilities, roles, and ambitions can therefore promote collaboration. Dialogues on a national level, highlighting success stories, can also inspire Swedish higher education institutions with lower levels of engagement in industrial PhD collaboration.

The Importance of Funding for Collaboration

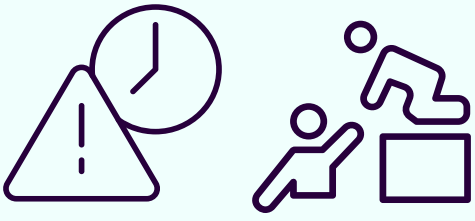
Both the interviews and the survey show that funding through a third party is often crucial for enabling industrial PhD projects. The students themselves highlight increased funding and financial support as important factors. External research programmes play a dual role – as sources of funding and as structured arenas for collaboration. To encourage more funders to invest in industrial PhD students, it is important to make the positive effects visible – for participating parties and for society at large. It is in the integration between academia, industry, and society that new and relevant research questions emerge, contributing to the development of Sweden as a knowledge-driven nation.

Challenges in Collaboration Through Industrial PhD Students

Industrial PhD projects offer significant opportunities for knowledge exchange between academia and industry, but they also involve a complex balancing act between academic requirements and business needs. One of the most prominent challenges is that the PhD student is expected to contribute to the company's operations while simultaneously pursuing PhD studies at a high academic level. This is clearly reflected in both the interviews and survey responses.

The industrial PhD students themselves describe challenges related to balancing different expectations, lack of time, dual workloads, and unclear roles. Both interviews and survey data highlight the importance of establishing clear agreements that regulate the student's time between the company and the PhD programme. The need for alignment and a shared understanding of the project's purpose and conditions is also emphasised.

The report *Legal Barriers to Collaboration? Legal and Governance Issues in PhD Collaboration*[7] stresses the importance of parties discussing their respective goals for collaboration and taking time to understand each other's conditions. Long-term relationships build trust, which facilitates agreements and contracts. The importance of viewing industrial PhD projects as long-term projects cannot be stressed enough, where challenges may be greater between parties without prior relationships.



Contractual Issues and Rights

Issues related to publication rights, confidentiality, and intellectual property (IP) are central to collaboration between academia and industry. The PhD student has the right to publish their research, while companies often need to protect confidential information and innovations. For companies, publishing sensitive data may pose financial risks.

The majority of interviewees emphasise the importance of addressing these issues early in the process and regulating them through contracts. Several respondents call for standardised procedures across universities, particularly regarding contract content. As stated in the report *Legal Barriers to Collaboration? Legal and Governance Issues in PhD Collaboration*[7], model clauses could be shared, joint wording developed, and forums established between support functions at higher education institutions to simplify the administrative process around industrial PhD students.

Interestingly, the industrial PhD students themselves do not rank these contractual issues as significant challenges. This could indicate that contractual issues are well managed or that discussions around them primarily occur at the supervisor/managerial level.

Skills Supply and Career Paths

A specific issue raised by industry representatives is the uncertainty about whether the PhD student will remain with the company after graduation. Among the industrial PhD students who participated in the survey, more than half intend to continue their careers in industry, while around 30% are still undecided. Only about 15% currently see academia as their future career path. To maintain competence within Swedish industry, support structures are necessary, both for individuals and companies involved. This is especially relevant for international industrial PhD students.

A common challenge among respondents is the lack of competitive salaries and clear career paths. According to *The PhD Crisis – A Threat to Sweden's Prosperity*[1], the difference in median salary between employees with a master's degree and PhD holders is less than 1 %. The report states:

"If employers are serious about their constant claims of a shortage of advanced competence, they must pay PhD holders better. Only then will we have the incentive for more engineers to pursue PhD education."[1]

The report *Utländska masterstudenter och doktorander lämnar Sverige (International master students and PhDs are leaving Sweden)* by the Confederation of Swedish Enterprise (Svenskt Näringsliv)[6] shows that low salary levels are one of the main reasons why international PhD students leave Sweden after completing their studies, which reinforces companies' uncertainty about whether the industrial PhD student will remain after graduation. The importance of offering career paths for industrial PhD students, as well as mentoring and competitive salaries, cannot be more evident.

Benefits Outweigh the Challenges

Collaboration between academia and industry through industrial PhD students offers great potential, but requires a clear structure, shared understanding, and well-designed agreements. Challenges related to balance, alignment, contractual issues, and long-term skills supply must be proactively managed to ensure that both the industrial PhD student and the involved organisations gain maximum value from the collaboration. All interviewees who currently have or have had an industrial PhD student agree that the benefits of such projects clearly outweigh the challenges.

How Can the Number of Industrial PhD Students Be Increased?

The data shows that several factors can influence the potential for increased collaboration between academia and industry through industrial PhD students:

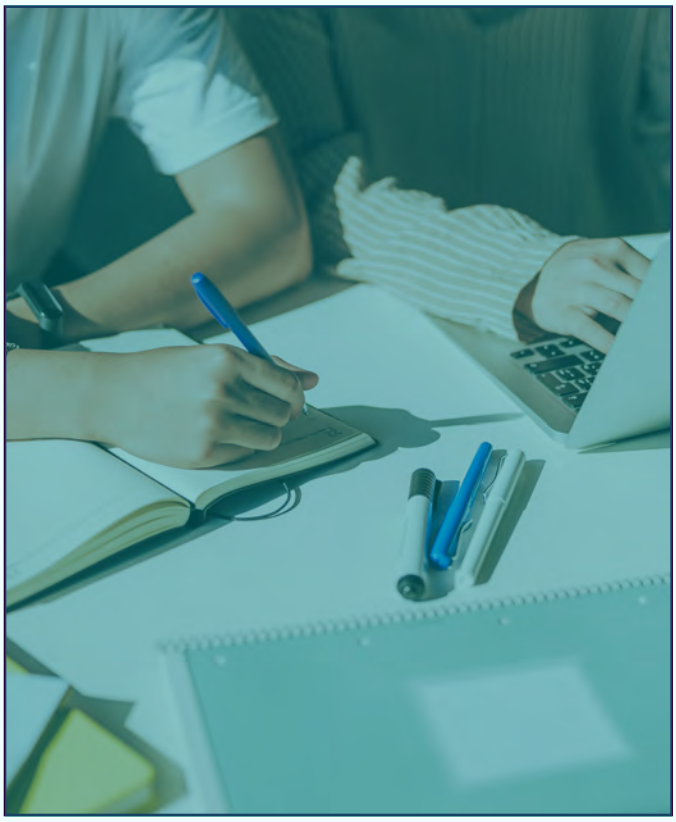
1. Funding from a third party is a fundamental prerequisite for the continuation and expansion of industrial PhD programmes. Both academia and industry emphasise that access to research funding, particularly through external programmes, is crucial for enabling long-term investments.

2. Clear structures and reduced administration are needed to facilitate collaboration. Academia highlights that current processes for establishing industrial PhD projects are complex and time-consuming, especially regarding contract management. More collaborative projects with established frameworks – like research programmes –are proposed as a solution, along with increased cooperation between Swedish higher education institutions, for example, in contract design.

3. Increased awareness and visibility of the industrial PhD role is necessary. There is a need to communicate better what an industrial PhD student is, what career opportunities are available, and how collaboration works. Suggestions include matchmaking events, marketing of open positions, and highlighting success stories to inspire more stakeholders.

4. Stronger incentives and career pathways can enhance attractiveness. Several respondents stress the importance of competitive salaries and clear development opportunities for industrial PhD students, even though economic incentives were not considered the top driving force behind becoming an industrial PhD student. A salary premium for a PhD degree and a sustainable salary development plan are mentioned as concrete incentives.

5. Structured and long-term collaboration between academia and industry is essential. Collaboration through industrial PhD students is built on a mutual understanding of each other's needs. More industry-driven projects, increased support for collaborative initiatives, and greater integration of industry perspectives into academic activities are also required.



International Industrial PhD Students – Opportunities and Challenges for Long-Term Skills Supply

Strategic Initiatives for International Talent Attraction

Sweden has recently intensified its efforts to attract and retain international talent. The government initiative *Work in Sweden*[5] and the expanded mandate of the Swedish Institute[12] are clear examples of this. The aim is to strengthen Sweden's appeal as a destination for highly qualified professionals. However, for these efforts to have long-term impact, a clear strategic direction is needed – otherwise, they risk becoming short-lived initiatives. Interview results show that a majority of respondents are positive toward hosting international industrial PhD students. This attitude is also confirmed in the *Talent Map Report*[10], which shows that Swedish companies are generally open to international recruitment. Knowing that, we can see a solid foundation for continued development, but as it looks right now practical and structural challenges often dominate the discussion.

Challenges for International Industrial PhD Students

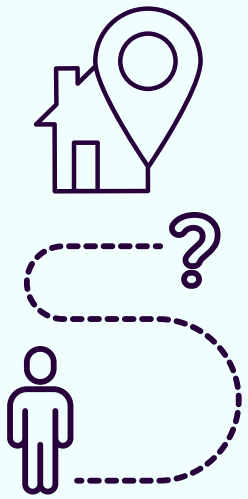
The obstacles faced by international industrial PhD students largely mirror those encountered by international students and researchers in general. These include practical issues, such as residence permits, housing, and administrative matters, as well as softer aspects like language barriers, cultural differences, and a sense of belonging. According to the *Talent Map Report*[10], language is the main reason why international talents choose to leave Sweden. This is confirmed in our own survey, where language is cited as the most significant challenge, followed by other cultural factors. Interviews also reveal uncertainty about whether international industrial PhD students will remain in Sweden after graduation. This underscores the importance of creating favourable conditions for continued establishment – both for individuals and for companies seeking to retain talent.

Migration issues are repeatedly raised in interviews as one of the most significant barriers to international recruitment. Several changes are currently underway in this area – some positive, others more problematic – for the group of highly qualified international professionals. For researchers, proposed improvements include simplified transitions between permits, extended job-seeking permits, and increased mobility during permit processing times *DS 2024:31 Bättre migrationsrättsliga regler för forskare och studenter (DS 2024:31 Better migrations rules for researchers and students)*[11]. To facilitate international recruitment, a coherent migration policy is needed – one in which reforms do not counteract each other.

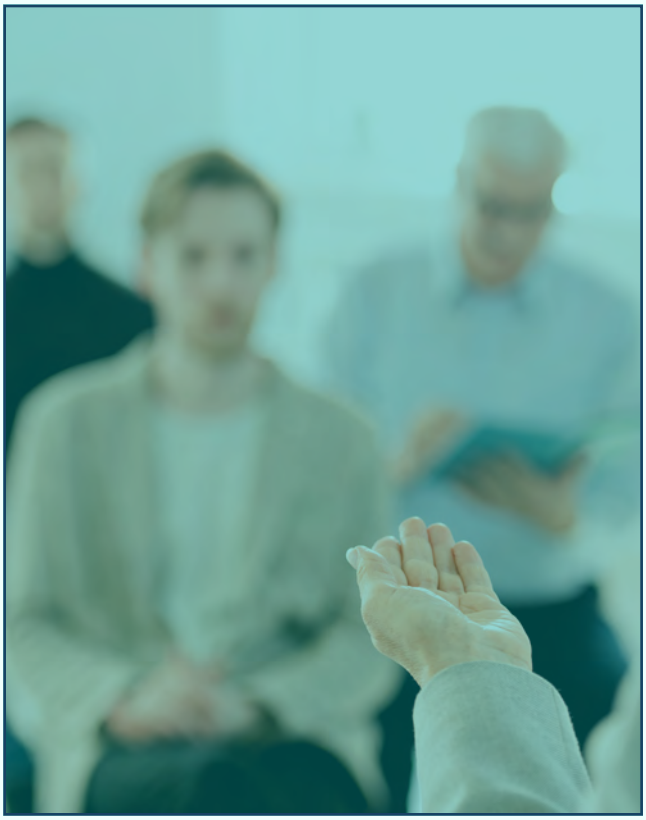
Conditions for Attracting More International Industrial PhD Students

When it comes to increasing the number of international industrial PhD students at higher education institutions and companies in Sweden, the responses align closely with the general views of the entire respondent group regarding industrial PhD students. International PhD candidates emphasise the importance of sufficient funding and the need for Sweden to promote industrial PhD opportunities on international platforms. They also highlight the need to simplify administrative processes, particularly during the application and onboarding phases. What distinguishes the responses from international PhD students is the need for improved migration regulations and work permits, as well as efforts to support cultural and linguistic integration. Improved housing conditions, especially in metropolitan areas, are also seen as a key factor in Sweden's ability to attract more international industrial PhD students.

Internships as a Strategic Tool to Retain Early Career International Researchers



EURAXESS Sweden's report *Can Sweden Afford to Lose Them?*[9], shows that a vast majority of researchers leave academia as they progress up the academic ladder. According to *International master students and PhDs are leaving Sweden*[6], a significant proportion of international PhD students leave Sweden immediately after completing their studies, even though many would prefer to stay. A lack of understanding of recruitment processes and the structure of the Swedish labour market is a contributing factor. This is also confirmed in *Can Sweden afford to lose them?*[9], where 76 % of surveyed early career researchers stated they had little or no knowledge of the Swedish labour market. This undermines the government's goals to attract and retain international talent, such as those outlined in the *Work in Sweden* initiative[5]. To better support international researchers in staying in Sweden and creating career opportunities outside academia, internships during the PhD or postdoc period could be a valuable initiative. Through internships, early career researchers gain concrete insight into how their expertise aligns with the needs of the Swedish labour market, what roles exist, and how recruitment processes work. Internships can thus serve as a bridge between academic education and working life, contributing to increased post-graduation establishment.



Limited Access to Internships for PhD Students in Sweden

Based on, primarily our benchmark, the following conclusions regarding internships can be drawn:

1. Limited access to structured internship programmes for early career researchers in Sweden
Sweden currently has a system for internships at the bachelor's and master's levels, but largely lacks structured opportunities for PhD students and postdocs. There is significant untapped potential to connect research expertise with industry through more tailored internship models.

2. International role models show the way
Internationally, many companies have established clearly defined internship programmes for PhD students and postdocs. These programmes serve as strategic recruitment tools and strengthen collaboration between academia and industry. They therefore offer valuable inspiration for Swedish stakeholders.

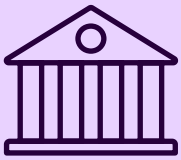
The Way Forward – Toward a More Inclusive Ecosystem

Through increased national coordination, more transparent labelling of available internships for young researchers, and targeted policy support, we see a great potential to develop a more inclusive ecosystem in Sweden – one that also includes meaningful internship opportunities for young researchers.

In the report *Aligning PhD education with local industrial employers' needs: a comparative case study* by Germain-Alamartine & Moghadam-Saman, 2020[13], Science Parks are highlighted as a promising bridge between researchers and industry:

"The creation, communication, and support of opportunities for intersectoral mobility, e.g. through short-term industrial experience during doctoral education could be used as a source of prevention against the skills mismatch, addressed to both PhD students and industrial employers".

Recommendations for the Road Ahead



Academia

◊ The role of management in strengthening collaboration

The management of Swedish universities should actively develop and anchor strategies for collaboration with industry – especially around industrial PhD students and internships. Clear internal communication creates an understanding of the value of collaboration.

◊ Develop transparent and standardised agreements

Swedish universities should collaborate on standard model clauses and contract structures for industrial PhD students to reduce internal competition and simplify collaborations. Clear agreements reduce uncertainty about responsibilities, roles, time and rights.

◊ Strengthen internal support structures and facilitate knowledge transfer

Establish internal forums between support functions such as law, finance and HR to streamline the management of industrial PhD projects. Facilitate knowledge transfer between institutions to increase commitment and understanding of the form of collaboration.

◊ Develop internship programs for young researchers

Develop internship models in dialogue with industry that can be integrated into PhD education or postdoctoral employment. Internships provide insight into the labour market and strengthen opportunities for establishment outside academia.

◊ Develop support structures for linguistic and cultural integration

Offer language courses, mentoring and social activities to increase belonging and facilitate integration among international industrial PhD students. Create space in the everyday lives of researchers so that the efforts are accessible and practical.

Companies

◊ Dare to try – the opportunities are many

Companies that do not yet collaborate with academia through industrial PhD students are encouraged to dare to try. Through good dialogue and understanding of each other's activities, there is much to be gained, and over time, the mutual benefit is strengthened.

◊ Ensure long-term competence supply

Develop strategies to retain industrial PhD students, for example, through career paths, mentoring and competitive salaries. Strengthen support for linguistic and cultural integration to increase the retention of international industrial PhD students.

◊ Build trusting relationships with academia

Invest in long-term collaborations and a common understanding of industrial PhD students to reduce friction and increase efficiency. Be open and curious about new projects and maintain an active dialogue with academia.

◊ Develop internship programs targeted at doctoral students and postdoctoral fellows

Create internship programs as a strategic tool to identify and recruit research talent that meets the industry's skill needs, which will also strengthen the connection to academia.

Other actors in society

Expand third party funding

Extend government support for public research funding organisations to enable more industrial PhD students, with a particular focus on small and medium-sized companies. Simplify the application process, make funding opportunities visible and invest in research programs that promote collaboration between academia and industry.

Make the societal benefit of industrial PhD students visible

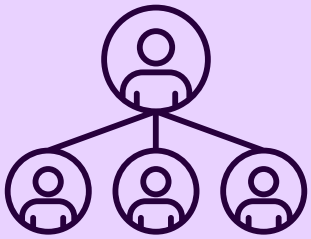
The government should appoint a suitable actor to be responsible for communicating the role of industrial PhD students in strengthening innovation, competitiveness and knowledge supply. Show good examples of international industrial PhD students who have established themselves in Sweden. Carry out a targeted information campaign aimed at small and medium-sized companies.

Promote collaboration through policy and guidelines

Develop national guidelines that strengthen collaboration between academia and industry, with a focus on the role of industrial PhD students in skills supply. Introduce a collaboration bonus for participating universities and companies.

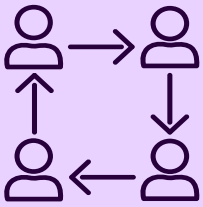
Create support structures for international industrial PhD students and simplify migration rules

Strengthen support around migration, housing and integration for international industrial PhD students. This can be done by developing more so-called International Houses where companies can also turn for advice. To simplify the recruitment and retention of international industrial PhD students, migration rules should be harmonised.



◊ Introduce national coordination and policy for internships in postgraduate education

The government should instruct the appropriate authority to create a national framework for internships for PhD students and postdoctoral researchers with clear guidelines and incentives. Inspiration can be drawn from international models and Swedish initiatives such as the Karolinska Institutet *Internship Programme*.



Academia, industry and other actors in society together

◊ Create meeting venues for strengthened collaboration

The development of meeting venues for collaboration between academia and industry is a shared responsibility. Although all actors have their share of responsibility, the development can be driven by, for example, collaboration units at universities, Science Parks and industry organisations from the business community, as well as regional or national actors such as the Swedish Agency for Economic and Regional Growth, Economic Development and Business Sweden. To promote international participation, the meeting formats should be inclusive, for example, by being offered in English.

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