An overview of Aalborg University's industrial PhD programme approach

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Background(National context)

- The national (Danish) approach to industrial PhD's is formalized through applications to the Danish Innovation Foundation
- It falls under the responsibilities of The Danish Ministry of Education and Research, The Counsel for Technology and Innovation, and The strategic Research Council – as an independent governmental organ (The Danish Innovation Foundation)
- Applicants relevant for this process:
  - *Companies that have a geographical department in Denmark and have the finances and facilities to run the project.*
  - *Universities that are officially approved to undertake PhD programs, as well as being able to attach a supervisor to the project.*
  - *Candidates who have completed their master's degree with at least 10 in the thesis and either have at least 8.2 on average for bachelor and candidate combined or 9.5 for the candidate alone.*
  - *In 2024, the Innovation Fund can also support companies that have a geographical division in Greenland or the Faroe Islands.*
  - *See the current guidelines for more on grade requirements and the possibility of exemption.*

A business Ph.D. project takes 3 years.

https://innovationsfonden.dk/en/p/industrial-researcher

Relevant material

https://innovationsfonden.dk/en/p/industrial-researcher

https://ufm.dk/en/research-and-innovation/cooperation-between-research-and-innovation/model-agreement/?set_language=en

https://innovationsfonden.dk/sites/default/files/2025-02/01.01.2025%20Guidelines%20Industrial%20PhD_FINAL.pdf

The national context (continued)

- Several models and agreements in place for both the public- and private institutions wishing to enroll an industrial PhD student
  - https://ufm.dk/en/research-and-innovation/cooperation-between-research-and-innovation/model-agreement/industrial-phd-project-opdateret-2-feb-2011.doc
- Grants are applied for in collaboration between a company and the research institution(s)
  - How much money can be applied for?
    - The company's grant is DKK 712,000 (of which DKK 612,000 is a contribution to salary and DKK 100,000 is a contribution to travel activities.
    - The university's grant is DKK 360,000 (incl. overhead).
- The companies have the option of collaborating with one or more Danish research institutions
  - These all have their respective channels and departments (typically their PhD Schools) that handles the formalities of enrolment (and supervision).
    - https://dkuni.dk/om-os/de-8-universiteter/

The total pool of available funds (grants) is decided by the National Finance Act (by law)

Finances can cover:

University grant can be used at:

Supervision of the Industrial PhD student.

Facilities at the university, including equipment, materials, apparatus (procurement and / or use) as well as external services necessary to complete the university part of the project.

Participation in relevant PhD courses at the host university.

Assessment of the PhD dissertation.

Dissemination of results, including printing of the dissertation.

The company grant can be used at:

salary for the business PhD student

travel activities, this includes one roundtrip to the destination per. exchange/conference, visa, travel insurance, accommodation and university fees. Diet, daily/local transport, books, etc. are not covered.
The company must pay all other expenses for the project, including equipment, materials and data collection. This also includes personal equipment for the Industrial PhD, such as laptop, cell phone, etc.

The grant to the company may not exceed 50% of the cost of the project.

Salary for business PhD students
An Industrial PhD student must have at least the same total salary (salary + pension) as an ordinary university-employed PhD student. The AC agreement regulates the salaries of PhD students who are classified according to §4 and §8 of the agreement.

NB:Variations exist (e.g., some industrial PhD's have a salary extending way beyond traditional PhD salaries (but in agreement with their company, they can negotiate salaries that might be the same as before their start of an industrial PhD period) – this is not directly stated in the formal procedures (but this is also what-among a few things- separates the process from ordinary PhDs in Denmark)

The institutional context (AAU)

Receive funding through the industrial PhD scheme

In a hectic work schedule with scarce resources, it may be a challenge for businesses to find the time and money to develop new ideas and products. Part of the solution may be to hire a PhD student.

If you employ a PhD student from Aalborg University, you may apply for a grant over a three-year period under the Industrial PhD scheme offered by the Ministry of Science, Technology and Innovation. Once you have employed the PhD student, he or she will fall under the category of industrial PhD student.

Industrial PhD students work equal hours at your business and at Aalborg University. However, all their work will relate to the same project. (https://www.en.aau.dk/cooperation/companies-and-public-institutions/cooperation-researchers/industrial-phd)

In an Industrial PhD project, the company and Aalborg University (AAU) work closely together but from different perspectives. Therefore, it is important to establish a good framework for collaboration from the start.

While the company places a high value on the commercial aspect of the partnership, publications and the academic level of the research are of great importance to AAU. The Industrial PhD student should strive to bridge the two, which becomes easier if collaboration between the supervisors is close and well-coordinated.

https://www.aau.dk/samarbejde/virksomheder/samarbejde-forskere/erhvervsphd#aftal-rammer-og-fokus-for-erhvervsphd-projektet

What AAU adheres to (The Danish Innovation Foundation)

An Industrial PhD project is a business-oriented research and education project that is implemented in collaboration between a private or public company, an Industrial PhD student and a university. The project must comprise significant research of high quality and have direct or indirect business-related significance and effect in the short or long term. At the same time, the programme must ensure that the Industrial PhD student obtains a PhD degree. The Innovation Fund funds part of the companys salary expenses, among other things.

The Industrial PhD student is employed in a company in Denmark and at the same time enrolled at a university. The student will divide the working time between the company and the university and spend their full working hours in both places on the project and the education. The Industrial PhD student should have a supervisor at the university and a main- and co-supervisor in the company. The duration of the project corresponds to the duration of the education programme, which in Denmark is three years.

Industrial PhD is one of Innovation Fund Denmark's Industrial Researcher programmes that furthermore include Industrial Postdoc. An application for an Industrial PhD is in competition with other Industrial PhD and Industrial Postdoc applications. Both programmes do overall contribute to ensuring the Fund's objective of creating growth and employment in Denmark and supporting the development of solutions to specific societal challenges.

The Industrial Researcher programmes have the following specific objectives: • To educate and develop research talents to become industrial researchers. • To contribute to business-oriented research, development and innovation in Denmark. • To strengthen the collaboration between companies in Denmark and universities or research institutions at home and abroad.

https://innovationsfonden.dk/sites/default/files/2023-12/01.01.2024%20Guidelines%20Industrial%20PhD_1.pdf

The institutional context (AAU)

- *One way to ensure good collaboration from the outset is to establish clear expectations regarding aspects of the Industrial PhD partnership where the parties might have different wishes. It can be helpful to agree on:*
  - *goals, deadlines, and deliverables*
  - *distribution of the candidate's time between the university and the company*
  - *how results are to be communicated and presented within the company/at the university*
  - *meeting frequency (preferably formalize the meetings and schedule them in the calendar)*
  - *the three parties' roles in the project (who is expected to do what)*

Formal requirements (requested by AAU)

Requirements for the company:
The company must have a department located in Denmark, where the candidate is employed.

The company must be financially able to support the project throughout its duration (three years).

The company must appoint a company supervisor and a co-supervisor for the project, both from the company.

The company must belong to the private sector (see definition and guidelines).

Requirements for the candidate:

The candidate must fulfill the following requirements:
Hold a master's degree relevant to the project.

Have an overall weighted average grade of at least 8.2 on the 7-point grading scale or 9 on the old 13-scale (combined for bachelor's and master's degree). If the candidate's master's degree is a 120 ECTS program, only that degree can be considered. In that case, a GPA of 9.5 on the 7-point scale or 9.4 on the 13-scale is required.

Have received a grade of at least 10 for the thesis/final project.

A candidate whose grades are slightly below the required level can be approved if the candidate has other relevant qualifications.

Findings from an interview with the AAU PhD school coordinator

- **Funding and Classification:**
  - AAU exclusively utilizes external funding for PhD positions, and classification as an industrial PhD explicitly depends on financing from Innovation Fund Denmark (Innovationsfonden). Projects funded by other sources, even with industrial cooperation, are not officially industrial PhDs.
- **Differences from Ordinary PhDs:**
  - The industrial PhD differs only in terms of mandatory external collaboration with industry; academically, the requirements regarding courses, publications, and quality standards are identical to standard PhDs.
- **Time and Collaboration Model:**
  - Innovationsfonden no longer requires a strict 50/50 division of the PhD candidate's time between university and company. Instead, greater emphasis is now placed on clear expectation alignment between partners.
- **Facilitating Institution:**
  - Innovationsfonden is essential as the funder and key decision-maker. The Fund's clarity and prompt feedback on applications help improve future application quality. However, there is room for improvement, particularly regarding administrative flexibility.
- **Interactions and Networking:**
  - Regular attendance of Innovationsfonden representatives at events strengthens personal and institutional relationships, enhancing understanding of processes and expectations.

"All PhD positions at Aalborg University are externally funded. If the funds do not come from the Innovation Fund Denmark (Innovationsfonden), it is not classified as an industrial PhD."

"The only difference is the requirement for external collaboration, automatically fulfilled by industrial PhDs through the involved company. Otherwise, the requirements are identical regarding courses and publications."

"Previously, Innovation Fund Denmark required a 50/50 time allocation, which proved difficult to monitor. Today, there is more focus on thorough expectation alignment."

"The Innovation Fund's setup typically involves a PhD student employed in a company with formalised collaboration with the university lasting 1-3 years."

"Personal relationships and understanding of the fund's processes help us optimize applications and keep abreast of new opportunities."

Findings from an interview with the AAU PhD school coordinator Part 2

Challenges and Barriers in the Industrial PhD System

- **Lack of Strategic Internal Coordination:**
  - Challenges include the absence of a cohesive internal strategy at AAU, variable advisory competence, and insufficiently structured internal processes. This affects consistency and sustainability of good applications.
- **Economic and Administrative Complexity:**
  - The current economic model does not fully cover real expenses incurred by the institutions and companies, especially SMEs. Administrative procedures can also feel cumbersome.
- **Intellectual Property Rights (IPR):**
  - Ambiguity in patent and IPR issues can lead to conflicts, highlighting the need for explicit early-stage agreements.

Strengths and Success Factors of the Industrial PhD System

- **Flexible Initiation and Implementation:**
  - Flexibility allows AAU to swiftly initiate projects and adapt to needs. However, this flexibility might depend heavily on individual initiative rather than institutional structure.
- **Good Practices for Collaboration:**
  - Regular status meetings and structured feedback loops between companies, universities, and PhD candidates have proven effective and are recommended practices for enhancing project success.

"A challenge is the lack of a coherent strategy and internal ownership. The competency level among local advisors varies significantly.“

"The financial setup is generally appropriate, but does not always fully cover the actual costs of companies and universities.“

"Challenges can arise, particularly when results show commercial potential.“

"Flexibility is a clear advantage. We can quickly initiate initiatives.“

"Clear and regular meetings between the candidate, company, and university supervisor have proven effective."

Findings from an interview with the AAU PhD school coordinator Part 3

Future Outlook and Potential Areas of Growth

- **Growing Industry Demand:**
  - An increase in recognition of the value of research-based innovation in industry will likely enhance demand for industrial PhDs.
- **International Collaborations:**
  - Expanding international collaboration, especially within the EU, presents significant potential for growth, resource attraction, and knowledge exchange.

Economic Incentives and Resource Allocation

- Explicit financial details regarding salary support and operational costs are important for understanding motivations, challenges, and areas needing policy intervention or adjustments.

"The need will likely increase as companies increasingly recognize the value of research-based knowledge and innovation."

"There is significant potential in strengthening international collaborations, particularly within the EU."

"The company can receive up to DKK 17,000 monthly in salary support, plus DKK 100,000 for travel expenses. The university receives approximately DKK 360,000 in total for supervision and related costs."