



INDEK 2022

Enhancing
technology-based
value creation
and sustainable
industrial growth

Department of Industrial Economics and Management (INDEK)

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Our vision is to be a leading European center for research and education at the intersection between technology and management.



2022 – the year we came back to campus

Compared to the years marked by Covid-19, the year 2022 ended on a positive note. At the Department of Industrial Economics and Management (INDEK), we delivered on our tasks of education, research, and academic citizenship. During 2022, we also initiated several strategic endeavors, including the creation of an INDEK Advisory Board of senior industry representatives.

In the light of the KTH Research Assessment Exercise (RAE), we have launched a new strategic action plan for the department, which addresses how we should strengthen our strategic positioning, research focus, research quality, and publication strategy. Consequently, a bibliometric study was undertaken. Its results revealed that, with a few exceptions, most research at INDEK could be clustered around three different areas: innovation and operations management, organizational theory, and economics of innovation. The bibliometrics also showed that compared to our sister departments in Sweden, INDEK is well established at the scientific front line of our field in terms of publications, citations, and journal impact.

On education, we continue to provide courses with high relevance for industry and society. During 2022, we have also established a Master program in technology-based entrepreneurship, which will provide students with the skills to engage in corporate innovation or entrepreneurial ventures. Another important highlight of 2022 has been

”INDEK is well established at the scientific front line of our field in terms of publications, citations, and journal impact.”

the launch of INDEK Master Theses Days where our graduates presented their theses and celebrated with a large graduation dinner. Finally, on academic citizenship, many in the INDEK faculty has provided inputs to industries, policy makers, and mass media, as well as contributed significantly to the internal development of KTH as a university.

This yearbook is the first of its kind in our modern history but will certainly not be the last. In it, we showcase some of our achievements during 2022. It is based on input from all divisions of our department and edited by Professor Mats Engwall. In addition to this brief preface, the yearbook contains an overview of our long history and current activities, information on some of the key events of 2022, as well figures and facts of our department.

*Professor Cali Nuur, PhD
Head of Department*

This is INDEK

Industrial Economics and Management, commonly known by its Swedish abbreviation “INDEK”, is a department addressing issues of management in the contexts of engineering and technology.

INDEK has a history that dates back to the industrial revolution, when in 1912, the senior industrial engineer Erik Forsberg, was employed as Adjunct Professor to teach management to the engineering students of KTH. For a long time, industrial manufacturing dominated the research agenda, but over the years the field has successively expanded to include many new aspects and perspectives, such as innovation and entrepreneurship, project organizing, service industries, diversity management, circular economy, and industrial transitions. Throughout our history, however, issues of competitive and sustainable value creation have always constituted the core.

Multidisciplinary field

Today, INDEK represents a multidisciplinary field revolving around management, organizing,

and development of technology-based businesses and sustainable industrial growth. Most of our research is pursued at the organizational level, but we also conduct studies of inter-organizational relations, industrial and technological transformations, as well as studies of jobs and work processes. Our research contributes to long term competitiveness and sustainable growth in close collaboration with both the private and the public sector.

Education, research and citizenship

Our education is student-centered, innovative, and strongly anchored in research and in practice. The learning objectives are to develop the students' ability to understand and manage technology-based operations in different environments as well as to navigate during technological, organizational, and social transformations. Annually, about 5,500 students participate in our courses at the bachelor and master levels. In addition, about 150 MSc thesis projects with industrial partners are conducted every year.

The department has an extensive academic network including partners, such as Stockholm School of Entrepreneurship (SSES), Swedish Entrepreneurship Forum, Swedish House of Finance,

Institute of Management of Innovation and Technology (IMIT), Center for Sustainable Aviation, Integrated Transport Research Lab (ITRL), and Digital Futures. In addition, we cooperate with an large number of companies and societal actors both in our research projects and educational activities.

INDEK has a faculty of 33 professors and lecturers and 25 researchers, postdocs, and active PhD candidates, and is structured in three divisions: Accounting, Finance, Economics, and Organization (AFEO), Management and Technology (MT) and Sustainability, Industrial Dynamics, and Entrepreneurship (SIDE). Although the divisions are separate, there are significant interactions between them in terms of research and teaching activities.



59
employees

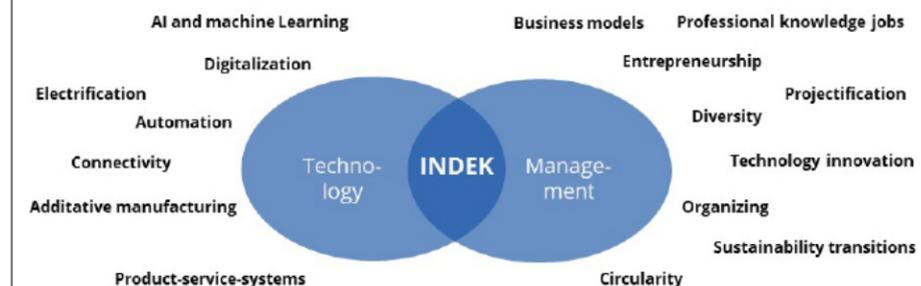
150
MSc thesis projects/year

60
courses

Did you know...

- INDEK is one of six departments at the KTH School of Industrial Engineering and Management, ITM.

Where technology meets management



Some key events 2022

On top of the extensive research and education, there were several key events of the department that strengthen our outreach to academia and society.



Coffee break with fellows and faculty at the first Advisory Board meeting.

May

Inaugurating the INDEK Advisory Board

On May 4, the INDEK Advisory Board was inaugurated. INDEK Advisory Board gathers about 20 senior fellows representing different key external stakeholders. The creation of the Advisory Board is an important measure to enhance our outreach to industry. The overarching purpose is to secure that our education and research activities will continue to be relevant for industry and society also in the future. The first introductory meeting was followed by a second meeting on November 4 that addressed current issues in the development of our educational curricula.

Mats Engwall is head of the INDEK Advisory Board



The first INDEK Master Thesis Days

May



On May 30-31, INDEK organized the first ever Master Thesis Days. For two full days, company representatives, family, friends, and faculty listened to approx. 180 students presenting the results of the thesis projects that they carried out during the Spring 2022. A broad range of subjects was covered, such as electrification of road transports, digitalization, cyber security, workplace organization, public procurement, financial portfolio risk management, modelling of supply chains, business model innovation, lean production, agile project management, and organizational development. In the evening, the student chapter organized a much-appreciated graduation party where students and faculty celebrated together.

Hosting International PhD Class on Sustainability Transitions

Dec

In December 2022, one of the first courses in the world on “critical and reflexive perspectives on sustainability transitions”, was organized at INDEK/KTH, putting the department at the forefront of the sustainability transitions field. The four-days course brought together over thirty doctoral students and a dozen lecturers from around the world, examining common assumptions about sustainability and how they feed into research. The course was generously funded by KTH Sustainability Office.

Anna Jerbrant new Docent

”I am an Associate Professor at the Management and Technology Division and I was promoted to Docent (equivalent to reader) in April 2022. The primary focus of my research is management, organizing, and change in project-based industrial companies. Contemporary project-based organizations are often complex and difficult to manage. Consequently, my research addresses how the organizing of project-based operations is shaped by the interplay between technology, intra-organizational aspects, and the wider institutional context. Since my research enhances the practical understanding of the kind of businesses that future engineers will work in, I teach the type of management issues that they are expected to be able to handle in their professional futures.”

April



Anders Broström Managing Director of Swedish Entrepreneurship Forum

In July 2022, Associate Professor Anders Broström of INDEK was appointed Managing Director of the foundation Swedish Entrepreneurship Forum, a network organization that initiates, conducts, and disseminates policy relevant research in the fields of entrepreneurship, innovation, business dynamics and growth.

July



New colleagues joining



Kateryna Morozovska

"I work as a researcher in sustainable energy systems, focusing on sustainable transitions in maritime shipping. Previously, I worked as a researcher in computer science and did my PhD in electrical engineering at KTH. I am also an early-stage entrepreneur, working on commercializing previous research findings at STING. At INDEK, I will work on analyzing the shift to alternative marine fuels from the perspective of Swedish and European ports."



Hannes Kristofersson

"I joined INDEK as a PhD Student in September 2022. My research, which is funded by the Swedish Transport Administration, focuses on electrification of road transports. This role is still new to me, but being at KTH is not. Both my bachelor's and master's studies were undertaken at KTH. The former in Mechanical Engineering and the latter in Industrial Management. These degrees were followed by a year of consultancy work before returning to KTH once again, this time for my PhD studies."



Beatriz Pérez Horno

"I am a PhD Student looking at circularity of products and materials in the industry. I have academic and professional experience as an industrial product design engineer, supported by a Master in sustainability and by work experience in sustainability and engineering consulting."

Charlotta Linse

"I am a new Postdoc, sharing my time between the INDEK Division of Management & Technology and the School of Electrical Engineering and Computer Science at KTH. My research interest is management of services and product development work, focusing on matters such as ambiguity and professional knowing-in-practice. I am engaged in a research project concerning organizational consequences of agile transformations."



Philip Kappen

"I joined INDEK in the autumn 2022 as Associate Professor of tech-based entrepreneurship. Before that I held positions in international business, strategy and entrepreneurship at Uppsala University and at Copenhagen Business School. I have also been a visiting scholar at Columbia University, Rutgers University, and Temple University. My research is concerned with the management of innovation in multinational firms, internationalization processes and intrapreneurship in general. My teaching at KTH is predominantly on various aspects of entrepreneurship."



Christian Thomann

"I joined INDEK during the fall of 2022 as Associate Professor of corporate finance. From 2010 until 2022 I worked at the Swedish Ministry of Finance as senior advisor at the tax and customs department. From 2017 until 2021 I was vice chair of the OECD's working party on tax policy analysis. My research interests are in corporate responses to environmental taxes and risk management and insurance, currently funded by grants from the Swedish Research Council, Marianne and Marcus Wallenberg Foundation, and Jan Wallander and Tom Hedelius Foundation."

Academic Citizenship

Examples of academic collaborations



Examples of industry collaborations



Engagements outside KTH

INDEK faculty are engaged in society and held the following positions, among others, during 2022:

- **European Academy for Industrial Management**
 - fellow: Mats Engwall
- **Institute of Management of Innovation and Technology (IMIT)**
 - board: Cali Nuur; fellow: Mats Engwall
- **Marie Cederschiöld University**
 - faculty board: Johann Packendorff
- **Politecnico di Milano; School of Management**
 - advisory board: Mats Engwall
- **Ratio Institute**
 - board: Elina Gobena; researcher: Kristina Nyström
- **Scandinavian Academy of Industrial Engineering and Management (ScAIEM)**
 - chairman: Mats Engwall
- **Stockholm School of Entrepreneurship**
 - board: Cali Nuur
- **Swedish Entrepreneurship Forum**
 - managing director: Anders Broström; researchers: Pontus Braunerhjelm, Per Thulin
- **Swedish Gender Equality Agency**
 - scientific committee: Anna Wahl
- **Swedish Human Factors Network**
 - board: Pernilla Ulfvengren
- **Swedish Project Academy**
 - fellows: Mats Engwall, Anna Jerbrant, Johann Packendorff
- **Swedish Royal Academy of Engineering Sciences (IVA)**
 - fellows: Pontus Braunerhjelm, Mats Engwall
- **Swiss National Science Foundation**
 - gender equality commission: Anna Wahl.

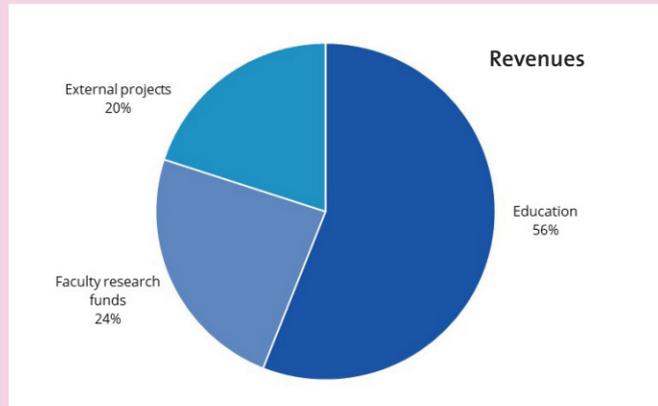
Other engagements include expert roles on tax reforms and economic growth for the Ministry of Finance, the Swedish Government, and OECD, expert roles on aviation issues for the Ministry of the Interior, in the Swedish ISO-committee on circular economy, for Swedish Agency for Growth Analysis on industrial implications of AI, as well expert evaluation roles for the Swedish Innovation Agency (VINNOVA) and national science councils in, e.g., Sweden, Canada, Greece, Latvia, and Lithuania. Furthermore, INDEK faculty has been represented on expert panels assessing research proposals and educational programs at, e.g., Technical University of Denmark and at Halmstad University.

Engagements within KTH

INDEK faculty are also extensively engaged in KTH's operations at various organizational levels. During 2022, such roles include:

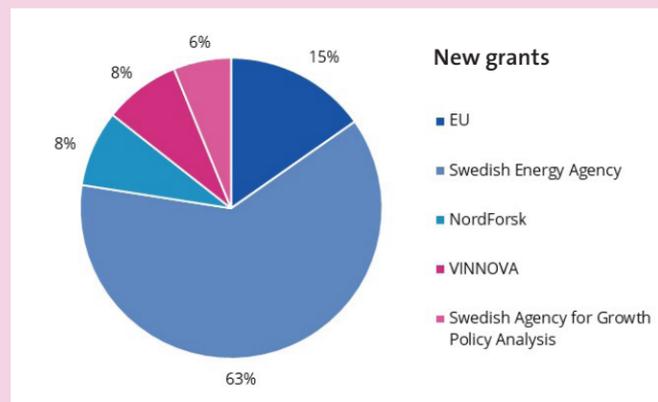
- **KTH Vice-President of Gender Equality and Values**
 - Anna Wahl
- **KTH Appointment Board**
 - Monica Lindgren
- **KTH Faculty Development**
 - program director: Johann Packendorff
- **KTH Equality Office**
 - expert advisors: Monica Lindgren, Johann Packendorff, Åsa-Karin Engstrand, Charlotte Holgersson
- **KTH - Stockholm Environment Institute partnership**
 - steering committee: Emrah Karakaya
- **ITM School Management**
 - vice dean of education: Anna Jerbrant
- **ITM IRIS Program**
 - project director: Anna Jerbrant; Area Coordinators: Anders Broström, Frauke Urban, Mats Engwall
- **MSc in Industrial Engineering and Management (CINEK)**
 - program director: Mats Engwall, until April 2022; Åsa-Karin Engstrand from June 2022.
- **Master in Industrial Engineering and Management (TIEMM)**
 - program director: Andreas Feldman
- **Master in Industrial Management (TINEM)**
 - program director: Emrah Karakaya; deputy program director: Lars Uppvall
- **Master in Innovation and Entrepreneurship**
 - program director: Mana Farshid
- **MSc in Industrial Engineering and Sustainability**
 - deputy program director: Pernilla Ulfvengren
- **KTH Centre for Sustainable Aviation**
 - director: Pernilla Ulfvengren
- **Digital Futures**
 - digitalized industry: Mats Engwall; educational transformation: Mattias Wiggberg
- **SCI School, strategic council**
 - Anna Wahl.

Finances and Academic staff



A lower turnover

The total annual turnover of the department for 2022 was SEK 91,351,609 which is slightly lower than the previous year. The largest revenue stream is education representing 56 % of the overall budget. In addition to grants from previous years, INDEK researchers were granted funding for new research projects of SEK 5,083,697.



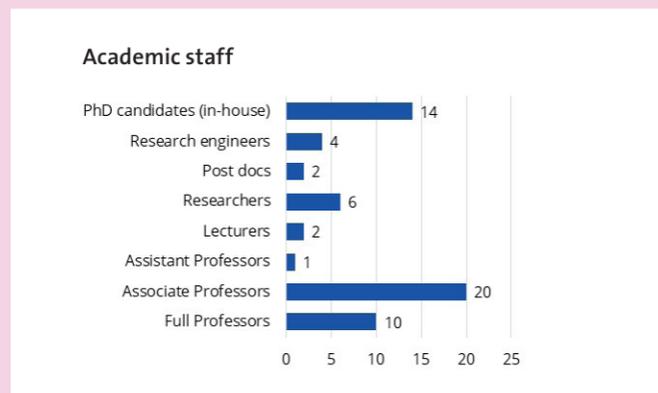
5,083,697

SEK in grants for new research projects

59 people belong to INDEK

The academic staff of INDEK consisted of 59 people during 2022, with a senior faculty of 33 professors and lecturers in total. In addition, INDEK has in-house and industrial PhD students, post docs and researchers, as well as an extensive network of emeriti professors, guest lecturers, and teaching and research assistants.

During the year, two associate professors, two researchers, and two in-house PhD students were recruited. At the same time, two associate professors left the department, one to retirement and one to another university, two post-docs have moved to academic positions at other universities, and one of our in-house PhD-students graduated and is now working in industry.



Organisation

INDEK is managed by a management team consisting of the Head of Department, the Director of Studies, the Director of the PhD Program, the business controller, a PhD student representative, and the heads of the department's three divisions.

Division of Accounting, Finance, Economics, and Organization (AFE0)

The Division of Accounting, Finance, Economics, and Organization (AFE0) explores the dual domains of numbers and people. The topics researched range from high finance, the dynamics of markets and their economic underpinnings, management accounting practices, and more human centered activities that make organizations function in a meaningful and successful way. With significant ongoing changes, such as technology in use and unstable global conditions, existing theories and practices are being challenged and there is a clear need for new perspectives and solutions. AFE0 has taken that challenge to heart.

The ongoing research at the division addresses various issues, such as environmental policy and technical change, risk management and insurance, and regional and national competitiveness, implications of blockchains, algorithmic management, performance strategies in an era of "smart data", as well as the organizational role of men and practices to decrease harassment and to improve gender equality.

Staff: 14 faculty and 3 in-house PhD candidates.

Division of Management and Technology (MT)

The Division of Management and Technology addresses crucial societal issues, such as industrial transformation, sustainability, and digitalization by utilizing in-depth knowledge in core areas of industrial management, such as the management of innovation, technology, projects, and supply chains, as well as human factors and organizational leadership. The division's research focuses primarily on how established firms can effectively manage their operations and innovation processes.

Much research revolves around how industrial firms navigate the ongoing technology shifts of electrification and digital transformation. This research includes related topics, such as business model innovation, project organization, competence transition, management models for production teams, and more. Currently, the division is active within several industries, such as automotive, aviation, media, water utilities, road transportation, construction equipment, and airport logistics. The division has a strong tradition of exploratory approaches based on case study methodology in close collaboration with industry and society.

Staff: 10 faculty, 2 post-docs, and 6 in-house PhD candidates



Division of Sustainability, Industrial Dynamics, and Entrepreneurship (SIDE)

The Division of Sustainability, Industrial Dynamics, and Entrepreneurship (SIDE) works in the fields of sustainability transitions, industrial dynamics and technical changes, energy management, entrepreneurship, and industrial marketing. The division is a strong international environment and aims to hold a leading position in research and education, both nationally and internationally.

Research at the division is performed within areas related to technological and industrial changes where the focus is on innovations, creativity, entrepreneurship, and management issues relating to industrial transformations. Current research includes projects on eco-innovations, circular economy, climate change mitigation, transition towards sustainable energy, business models, corporate strategy, social entrepreneurship, industrial buying behavior, brand strategies, e-commerce, and fintech.

Staff: 13 faculty, 3 post-docs, and 5 inhouse PhD candidates

BSc and MSc Education

The department delivers a large number of courses to engineering programs across the five schools of KTH. During 2022, INDEK offered approximately 60 courses in total, of which about 20 % at bachelor level and 80% at master level. The courses covered a broad range of subjects within the field of industrial economics and management, such as: accounting, costing, corporate finance, business economics, innovation management, operations and supply chain management, business analytics, industrial marketing, entrepreneurship, gender studies, organizational theory, project management, industrial dynamics, and sustainability transitions. Through our engagement at Stockholm School of Entrepreneurship (SSES), INDEK also provides access to the thriving SSES-community of entrepreneurship

scholars and students from six universities in Stockholm.

INDEK is furthermore responsible for the execution of three Master programs with about 1,000 students in total:

MSc in Industrial Engineering and Management (CINEK, TIEMM). 5 years, bachelor + master, about 160-170 students admitted annually.

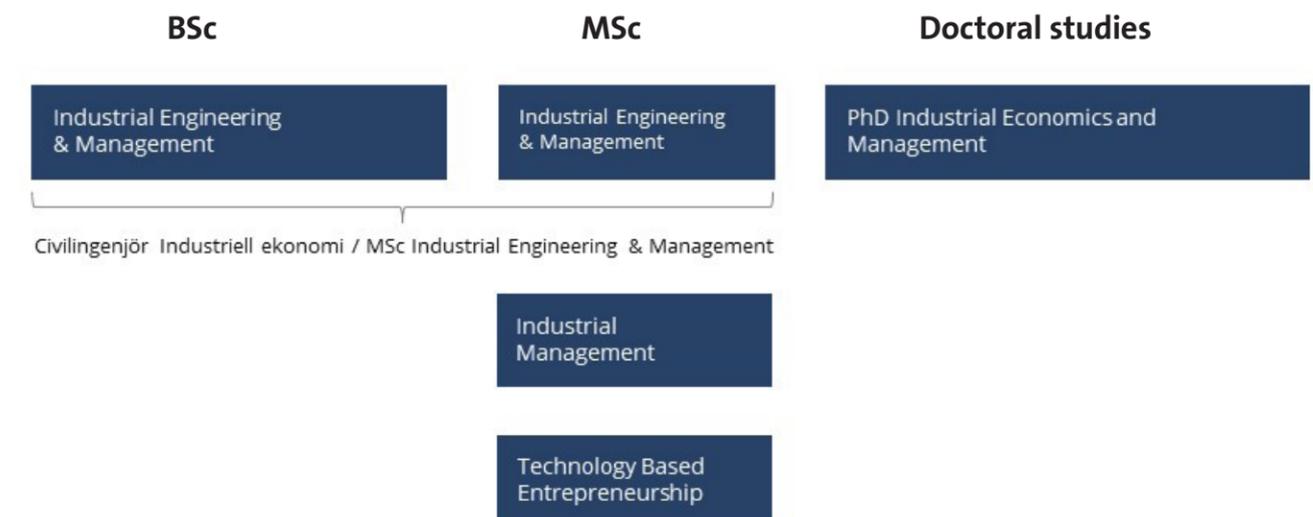
Master in Industrial Management (TINEM). 2 years master, about 100 students admitted annually.

Master in Entrepreneurship and Innovation Management (TEILM). One year master, about 30 students admitted annually.

During 2022, it was decided to redesign

and extend the existing one-year program (TEILM) to a new two-year Master program in Technology-Based Entrepreneurship. Development of the new program has started, and it will have its first intake of students in the fall of 2023.

Another major educational development project is a total revision of the INDEK courses in the first year of the Master program in Industrial Engineering and Management (TIEMM). Four brand new courses have been designed addressing the grand societal challenges that will shape the environment in which our graduates will work, i.e., climate change, digitalization, and globalization. The new courses are given for the first time during the Academic Year 2022/23.



Doctoral Education

INDEK's PhD. program relies on the multi-disciplinary expertise of approximately 40 faculties, intersecting technology, economics, management, social sciences, and humanities.

Students joining the program have the possibility to conduct their own research for a period of 5 years, during which 20% of the time is allocated to departmental duties. The research is expected to culminate in a doctoral thesis, an independent and original (theoretically and empirically) contribution to a specific field of research and the scientific community. In some cases, students may opt to publish and defend a licentiate dissertation halfway to the completion of the doctoral studies.

The program usually admits 2-4 students per year. Currently it has 24 active PhD students and about four graduate annually. In 2022, two licentiate and one PhD theses were published and publicly defended:

- Backteman, Richard (2022) Industrialization of Services – Technology and Routinization in the 21st Century. Licentiate Thesis.
 - Linderson, Sara (2022) Value-adding deployment of corporate lean programs in multinational production companies. Licentiate Thesis.
 - Newlove Eriksson, Lindy (2022) Critical Infrastructure at the Dawn of a Techno-Organizational Shift: Accountability and Public-Private Governance. PhD thesis.
- As per tradition, copies of theses can be viewed as they are hanging nailed to the board at the Sing-Sing ground floor.

PhD student Amelie Bennich

Who are you?

I am a fourth-year doctoral student, and my research focuses on digitalisation and how it impacts, and potentially transforms, established industries and infrastructures. During 2022, I have been the “Program Responsible Doctoral Student” (PAD) for our doctoral programme.



In your role as PAD, what have you been doing in 2022?

For the past year, we have been working on strengthening our doctoral programme in various ways. Among other things, we have established a programme council that will enhance the development of our doctoral programme, and we have worked on improving the outreach of our research and will, for example, participate at student career fairs to talk about the possibilities to pursue a Ph.D. Last, but not least, we continue to have a thriving collegial community among us doctoral students. We meet regularly at our monthly “doctoral student dialogues” as well as at other social activities.

What do you look forward to in 2023?

Even though I will hand over the role as PAD to a colleague, I look forward to continuing to be part of the ITM PhD Student Council and contribute to improvement of the doctoral studies at the ITM school.



PhD Class on Sustainability Transitions in December 2022

Ongoing research projects

Externally funded



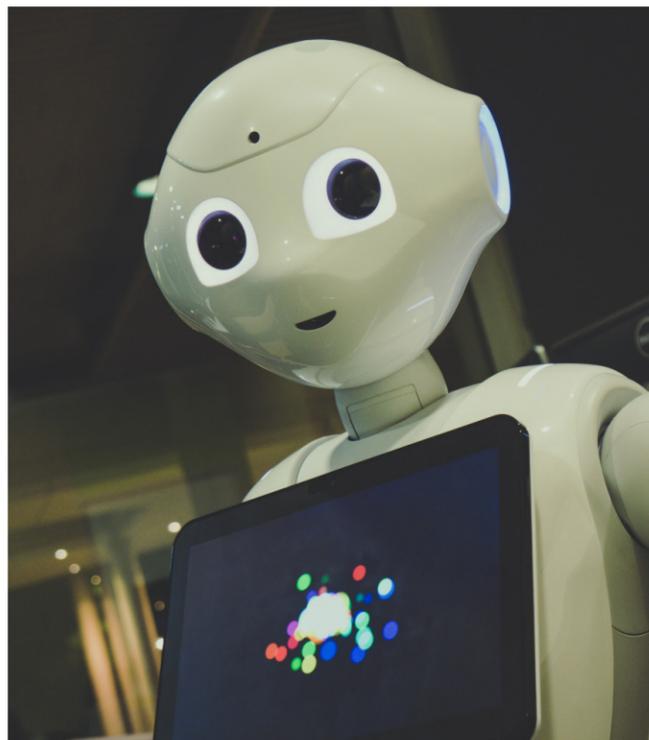
Ongoing research projects

Artificial Intelligence and industrial transformations

Researchers: Adam Berthold, Emrah Karakaya, Mats Engwall (PI)

The project aims to explore how the technology shift to artificial intelligence (AI) and autonomous systems might transform the technology-based industry in Sweden. Depending on how AI is applied, it could symbiotically strengthen existing businesses, or it could disrupt established companies, creating new industry logics and opportunities for new competitors to emerge. Drawing on theories from socio-technical transition and innovation management, the project brings a social science perspective on the phenomenon of AI and autonomous systems. We deploy a qualitative research approach, developing a repertoire of real-world examples representing different logics and different consequences of AI-implementation.

Partners: WASP-HS Program
Financing: SEK 10 million from Marianne and Marcus Wallenberg Foundation.



Promoting a hospitality industry free from human trafficking and prostitution: The effects on employees' work environment

Researchers: Charlotte Holgersson, Mana Farshid

The occurrence of human trafficking, prostitution and other forms of sexual exploitation can be regarded as workplace issues. This study aims to explore actions taken by hotels against human trafficking and prostitution, as well as other forms of sexual exploitation to understand how these actions affect the work environment and engagement among different categories of employees. The project analyses how employers in the hospitality industry can provide a safe and secure work environment by counteracting human trafficking and prostitution.

Partners: n.a.
Financing: SEK 2 million from The R&D Fund of the Swedish Tourism & Hospitality Industry (BFUF).

iSEE – Innovating Social Entrepreneurship Education

Researchers: Mana Farshid, Terrence Brown

The project aimed to explore and examine social entrepreneurship in the Baltic Region. It was further tasked to develop, collect, and test learning materials and organize an integrated and aligned course on social entrepreneurship across each country. The project ended in late 2022.

Partners: LAB University Applied Science (Finland), Riga Technical University (Latvia), University of Tartu (Estonia)
Financing: SEK 5 million (INDEK: SEK 1.5 million) from EU, European Regional Development Fund.

The impact of the EU Emissions Trading System on firm behavior and CO2 emissions

Researcher: Christian Thomann

Based on corporate data from Swedish industry, the aim is to study how EU ETS impacts businesses, industrial production, and emissions, e.g., does EU ETS result in a net reduction or are emissions merely being moved out of Europe and does EU ETS lead to technical development and the use of low-emission technologies? The project analyzes data on carbon dioxide emissions, production, innovation, dissemination of technology, trade, and environmental expenditure.

Partners: Stockholm School of Economics; Stockholm University
Financing: SEK 7.1 million (INDEK: SEK 1.7 million) from Marcus & Marianne Wallenberg Foundation and Jan Wallander and Tom Hedelius Foundation.

The impact of corporate governance on carbon emissions

Researcher: Christian Thomann

The project empirically examines how corporate ownership models, through their effect on corporate governance, affect firm carbon dioxide (CO₂) emissions abatement activities using Swedish data from 1990-2018 as the experimental setting.

Partners: Stockholm School of Economics
Financing: SEK 4.2 million (INDEK: SEK 480,000) from Swedish Research Council.

Environmental taxes makes companies invest in research

Companies with emissions affected by environmental taxes invest more in research and development. This is shown in a new international study by two Indek researchers.

Ambitious environmental goals require tools for society to change. Environmental taxes are such an instrument. We want to encourage companies to emit less by switching to cleaner production technology through price mechanisms. The taxes do not only reflect benefits to the treasury but also motivate companies to eliminate tax costs. In return, environmental improve-

ments are achieved.

"It's a win-win situation. And we know it works. The companies that are affected by environmental taxes invest in knowledge that will reduce the taxes," says Christian Thomann, one of the two researchers at Indek who participated in an international study recently published in the prestigious *The Review of Financial Studies*.

Those who have the most to gain from absorbing external knowledge and technical know-how are those with significant emissions. The study shows that they choose to assimilate existing research to reduce emissions rather than developing their own innovations.

"It could be a cement manufacturer who hires someone to implement technology stemming from the latest re-

search into existing facilities. However, the companies may also collaborate with or hire from universities or research institutes that have developed new technologies. As a researcher, it's satisfying to see that you take part in research results that are available," says Christian Thomann.

"This also shows that environmental taxes lead to behavioral effects regarding companies' spending on research and development. It is something that was hoped for and which we have now been able to prove."

Environmental taxes consist of taxes on energy, transport, pollution and natural resources. Last year (2021), environmental taxes in Sweden amounted to roughly SEK 103 billion (source: SCB).

Ongoing research projects

Men in focus – exploring homosocial cultures in organizations and developing methods to prevent sexual harassment

Researchers: [Charlotte Holgersson \(PI\)](#), [Monica Lindgren](#), [Johann Packendorff](#), and [Anna Wahl](#)

The project explores homosocial cultures in male-dominated organizations to contribute to our understanding of the dynamics of sexual harassment and to develop measures and methods for transforming homosocial cultures into spaces where men can act as change agents to promote gender equality and render workplaces free from violence and discrimination. By focusing on men, masculinities, and homosociality in relation to organizational cultures enabling men to exercise violence to maintain control, and by developing methods for counteracting sexual harassments through organizational development, the program contributes to current research frontiers as well as to the development of new practices in organizational change management.

Partners: Dalarna university, Department of Real Estate and Construction Management at KTH
Financing: SEK 17.3 million (INDEK: SEK 13.1 million) from FORTE Swedish Research Council for Health, Working life, and Welfare.

Research and Collaboration Program on gender-based violence and sexual harassment in academia

Researcher: [Anna Wahl](#)

The overall goal of the study is to establish research-based knowledge on the prevalence and consequences of gender-based violence and sexual harassment in academia in order to form a basis for the development of prevention and support models and methods. The study is aimed at employees, PhD students and students at the 38 higher education institutions that are members of the Association of Swedish Higher Education Institutions.

Partners: Karolinska Institute (PI), KTH, Malmö University, Gothenburg University
Financing: SEK 7.7 million (KTH: SEK 2.9 million) from the partner universities.

Ecosystems Analysis of an Electrified Logistics Hub in Stockholm South

Researchers: [Mats Engwall \(PI\)](#), [Adam Uhrdin](#)

The project aimed at analyzing which actors enable electrification of the transport sector and how these actors are affected by this technology transition. The focus is on implications on the actors' business models given different potential scenarios of the future and the interrelations between different business models by adopting an ecosystem perspective. The study has resulted in a map of various key roles in the ecosystem around electrified transports, focusing on transports in connection to logistics hubs. The analysis includes descriptions necessary actor roles for an ecosystem of an electrified logistics hub, which actors that potentially can take on these roles, and what different business models may be applied.

Partners: Sweco, Stockholm Environment Institute, Scania, ITRL at KTH, etc.
Financing: INDEK – SEK 600,000, part of a feasibility study financed by Triple F.

System Logic and Business Model Alignment in Smart Maintenance of Infrastructure

Researchers: [Mats Engwall \(PI\)](#), [Amelie Bennich](#)

Water utility systems are typical example of physical infrastructures whose inherent logics, technologies, and business models are difficult to change. However, new “smart” digital technologies have the potential to significantly improve the systems' productivity. The project focuses on how emerging digital technologies can improve the current operations of water utility systems and enable new system logics to be break through. The overarching purpose is to investigate how infra-system, such as water utility systems, can transform by means of closer alignment between their business models and emerging technologies.

Partners: RISE, University of Gothenburg, Linköping university, Stockholm Vatten och Avfall, etc.
Financing SEK 5 million, part of the InfraMaint Program of the Mistra Foundation.



NEAR – Town to gate sustainable transport

Researcher: [Luca Urciuoli](#)

An in-depth study focusing on logistics processes involving passengers moving from town to airport gates and vice versa, to examine whether a more efficient town to gate railway system may be feasible. Our focus is on the transport means available to move from town to gate and the optimization of operations necessary to access airport gates.

Project partners: Industrial Production at KTH
Financing: approx. SEK 200,000 within the ITM IRIS-program.

INFRA – Sustainable aviation – aviation noise and problem with aviation noise

Researcher: [Pernilla Ulfvengren](#)

The project addresses aviation infra systems' prerequisites for realizing technical noise-reducing solutions. It provides a rich picture of various issues based on actors' perspectives on aviation noise. The overall complexity hinders full control over development and function, leading to unintended consequences or negative externalities. INFRA concludes that the problem with aircraft noise will continue to increase around our major airports also with future electric aircrafts and drones. It has evolved into a “wicked” problem, which means it is difficult, if or near impossible, to solve.

Partners: Mälardalen University, Center for Sustainable Aviation at KTH
Financing: SEK 5.35 million from Swedish Transport Administration.

Ongoing research projects

Sustainable Energy Transformations in Aviation SETA

Researchers: Emily Christley, Emrah Karakaya, Frauke Urban (PI)

The project analyses the opportunities, challenges, and dynamics of transitioning towards more sustainable fuels and technologies for aviation, such as sustainable aviation fuels, electric aircraft, and hydrogen. The project spans industrial economics and management, political science, and sustainability assessment. The project explores socio-technical perspectives, policy-relevant dimensions, and life cycle assessment. Main research activities at INDEK in 2022 included interviews with experts from the aviation industry, field visits and participant observations, including a case study of Gotland as a testbed for electric aviation.

Partners: Linköping university, ABE School at KTH
Financing: SEK 13.8 million (INDEK: 8.2 million) from Swedish Energy Agency.

Strategic Challenges in Electrification of Transports: Business Models, Technology Shifts, and Systemic Change

Researchers: Mats Engwall (PI), Hannes Kristoffersson

The project aims to create a deeper understanding of how technology development, business models, and systemic change affect the electrification of road transports. The focus is on how the current transformation of the transport industry influences various actors with new business models and incentives and, conversely, what measures are required related to the transport business landscape to facilitate this desired technology shift to break through. The starting point is heavy road traffic, but the results should also be set in relation to the conditions for construction and earth moving equipment.

Project partners: n.a.
Financing: SEK 3.5 million, Swedish Transport Administration.

Conditions for electric 98-ton vehicle combination

Researcher: Adam Uhrdin

The development of charging infrastructure for heavy vehicles is lagging and holding back the transition to electrified transportation. This project studied the conditions for transports of energy chips between a terminal and a heating plant with an electrically powered high-capacity truck. The project focused primarily on the business aspects, but also included issues, such as charging infrastructure, power requirements, and driving modes. The results are expected to serve as reference examples and be applied to others intended transport arrangements within the district heating sector as well as within other transport systems.

Project partners: Skogforsk, Söderenergi
Financing: SEK 800,000 (INDEK, SEK 500,000) from Vinnova.

Incorporating ESG into Optimal Stock Portfolios for the Global Timber & Forestry Industry

Researcher: Hans Lööf

This project investigates how optimal portfolios of timber and forestry stocks perform relative to the global S&P timber & forestry index when corporate social responsibility (CSR) is considered. It incorporates CSR in the construction of optimal portfolios by utilizing environmental, social, and governance scores. Historical as well as copula-augmented predictive models and ESG-constrained optimization are used to analyze out-of-sample performance of various portfolio strategies over the period 2018-2021. The results suggest that socially responsible investments in forestry stocks are feasible without sacrificing risk-adjusted returns.

Partners: Linneus University
Financing: SEK 300,000 from Swedish Agency for Growth Analysis.

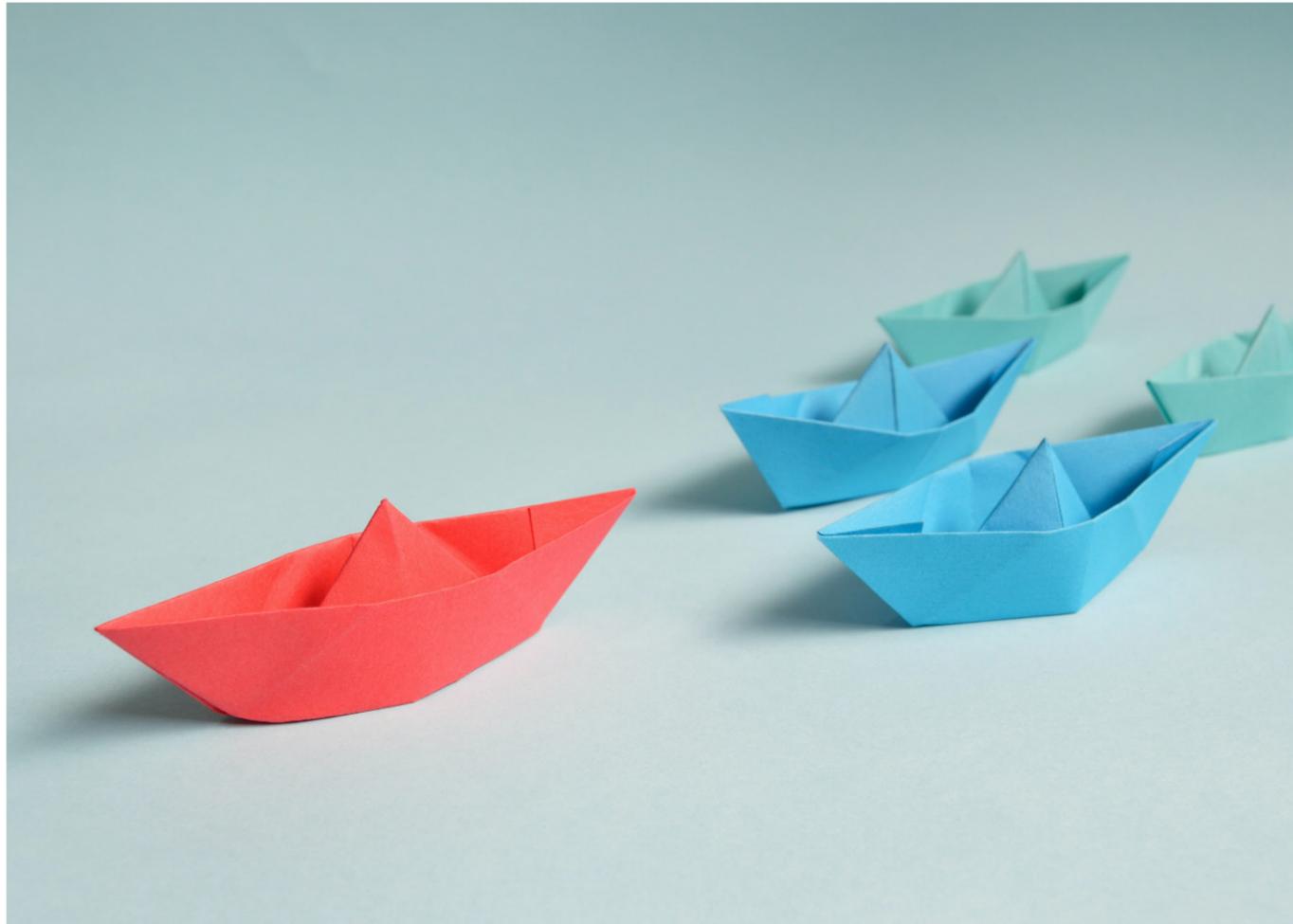
Urban Logistics Barkarby

Researcher: Adam Uhrdin

The trends of urbanisation and increasing e-commerce is increasing traffic in cities, resulting in congestions and emissions. One possible solution is to replace large trucks with small electric vehicles to take care of last-mile deliveries and collection of recycling materials in combination with micro-hubs for the transshipment of goods and materials. Thus far this concept has been tested in the project "Älskade stad", but to reap the full benefits of this concept it needs to scale up. Consequently, the project aims to describe and design a large-scale urban logistics system for circular material flows, together with a sustainable business model for such a solution. The ambition is that such a system will be implemented and tested in Barkarbystaden, the largest ongoing city development in Northern Europe, in a subsequent project.

Project partners: Bring, Barkarby Science, Järfälla kommun, Lunds universitet (Relog), Sustainable Innovation
Financing: SEK 846,000 (INDEK, SEK 60,000) from VINNOVA.





Leadership and organization for innovative, efficient, and socially sustainable production teams (LOOP)

Researcher: [Matti Kaulio](#)

The aim of the project is to adapt, implement and evaluate a management and organizational model for production teams and to achieve high innovativeness and organizational learning, regarding economic and social sustainability. The project is divided into three phases: situation analysis, adaptation and intervention, and evaluation. Expected results are to test a new approach for organizational learning in the production context.

Project partners: Chalmers, Gothenburg University, RISE, Aurobay AB, AB Volvo, Falks Metal AB.
Financing: SEK 6.6 million (INDEK SEK 400,000) from Vinnova.

Decarbonisation of Maritime Shipping Fuels (within IRIS)

Researchers: [Anissa Nurdiawati](#), [Frauke Urban](#), [Fumi Harahap](#), [Kateryna Morozovska](#)

The project aims to explore sustainable energy transitions for the maritime to mitigate its greenhouse gas emissions. We developed a framework that combines cost-effective supply chain optimization, scenario analysis and socio-technical perspectives to analyze the potential for transitions toward renewable marine fuels. Interviews with key stakeholders from the shipping industry, government agencies and research experts were conducted throughout 2022, in combination with modelling approaches.

Project partners: Department of Energy Technology, KTH
Financing: approx. SEK 2 million through the ITM IRIS Program.

BOAUT – Boundaries Of AUTonomy

Researchers: [Pernilla Ulfvengren](#)

The project investigated whether it is possible to assure that, with the support of a remote operations centre (ROC), maritime autonomous surface vessels (MASS) can operate as safely as manned ships. A demonstrator and scenarios representing MASS was developed and used during workshops conducted with professional operators. The role of ROCs, in relation to safety assurance, was defined as handling unknown unknowns. Common topics to resolve safety assurance are, e.g., AI transparency and explainability. The project identified new areas of for safety assurance, e.g., the ways through which ROC operators could be unfairly blamed when automation breaks down in the maritime domain, as their influence on a situation is not meaningful. The project finished during 2022.

Partners: RISE, Carmenta Geospatial Technologies, Undheim Systems, Swedish Maritime Administration, and Machine Design at KTH,
Financing: SEK 3.2 million (INDEK: SEK 385,000) from Assuring Autonomy International Programme, University of York.

The Value of Information on Material Composition in a Circular Society

Researchers: [Andreas Feldmann \(PI\)](#), [Beatriz Pérez Horno](#), [Daniel Berlin](#)

Current practices in the steel scrap value chain result in dilution of valuable elements in the material stock. These elements are lost and instead represent a contamination of the material stock. Through simulations and verifying case studies, this project aims to investigate how improved information can contribute to an optimal use of raw materials and thus reduce the need for virgin materials. Reducing reliability on virgin materials is essential in the industrial transition towards a sustainable society because of high energy savings, reduced greenhouse gas emissions, reduction in other environmental impacts related to the mining industry and cost savings.

Partners: Material Science, KTH
Financing: SEK 3.1 million from Swedish Energy Agency.

Do Companies Joining the Science-based Climate Target Initiative Perform Better? A Portfolio Study Using Global Stocks

Researchers: [Petter Dahlström](#) and [Hans Lööf](#)

Based on Fama-French 3 and 5 factor models and applying difference-in-differences as well as event study design, this study investigates the performance of portfolio stocks of about 1,000 firms globally that have joined the Science-Based Target Climate Initiative, using similar firms to form a control portfolio.

Partners: Linneus University
Financing SEK 320,000 from the Swedish Agency for Growth Analysis.

The FerroSilva Project (within IRIS)

Researcher: [Anissa Nurdiawati](#)

The steel industry is carbon- and energy intensive and efforts are undertaken to decarbonize the industry. This project aims to evaluate the cost-competitiveness, energy, and environmental performance of producing fossil-free iron using biogas derived from forest biomass. The project includes a lifecycle assessment in which socio-technical aspects such as policy and market dynamics are incorporated into scenario development.

Project partners: Department of Material Science at KTH, FerroSilva AB, Kobilde & Partners AB, Lantmännen, Ovako AB, Sveaskog AB, Uddeholms AB, Alleima AB, Chalmers University of Technology
Financing: SEK 5 million from Swedish Energy Agency.



Ongoing research projects

From Brownfield to Business

Researcher: Kristina Nyström

Due to the high degree of structural change in the economy, several large plants in Sweden have been closed during the past four decades. In this project, we map the extent of the brownfield land problem resulting from large plant closures in Sweden. How do exits of large plants that result in brownfield land impact the economy and the attractiveness of the area/region and the neighboring regions? What factors impact the success of redevelopment plans for brownfield land in Sweden?

Partners: Institute of Retail Economics (HFI)
Financing: SEK 1.9 million (INDEK: SEK 700,000) from The Kamprad Family Foundation for Entrepreneurship, Research & Charity.

Software Development Academy (SDA)

Researchers and staff: Mattias Wiggberg (PI), Kajsa Hallberg Adu, Sissi Rizko, Elina Gobena, Kwabena Asante Poku, Kai Böhrnsen, David Yu

Digitalization implicates that knowledge needs to adapt and develop. In this shift, highly educated people have a central role to play in finding solutions. Software Development Academy took on the task to see how effective reskilling of immigrants with academic degrees could be designed and operated. Throughout 2017-2022, we have been able to build, pilot, and roll out a program for reskilling as a solution to competence issues in our society and hence contribute to solutions for competence shifts needed.

The program was a success: 350 individuals from 76 different countries finished the program, which ran for 9 consecutive iterations. Despite the program being brief and cost-effective, 83 % of participants got a job in the IT sector within 6 months of completing it.

Partners: Lund University, Novare Potential
Financing: SEK 32 million (INDEK SEK 10 million) from Marianne and Marcus Wallenberg Foundation and the EU European Social Fund (ESF).

Fordonsdalen REACT Competence

Researchers: Mattias Wiggberg (Co-PI), Elina Gobena, Matti Kaulio

The rapid technical development in the automotive industry is characterized by self-driving vehicles, electrification, and digitization. When the transport ecosystem transforms, the demand for a competence shift in the automotive business increases. One key challenge is competence. KTH develops a completely new reskilling learning platform that is adapted to the needs of the industry, built with new smart technology and with new ways of working to meet personal learning requirements. The result is expected to be a real upskilling in a key area of transition for the enrolled companies as well as method development and research output.

Partners: Region Stockholm, Kista Science City
Financing: SEK 7.2 million (INDEK SEK 3.2 million) from the EU European Regional Development Fund.

AI in the media industry

Researchers: Agnes Stenbom, Matti Kaulio, Mattias Wiggberg (PI)

Artificial intelligence (AI) is changing many industries, for example the media industry. The challenges that AI and digitalization create cannot only be met by one sector, it requires collaboration. The research can generate insights that will change the entire industry. The goal is to identify opportunities and reliable ways for the media industry to continue working with AI and to support sustainable implementation.

This project is carried out by an Industrial PhD-candidate from Schibsted in the field of responsible use of data and AI in the Nordic media industry.

Partners: Schibsted
Financing: SEK 3.6 (INDEK SEK 321,000) from Schibstedt.

IncluSTEM

Researchers: Mattias Wiggberg (PI), Kajsa Hallberg Adu

IncluSTEM is a strategic partnership program between three European universities. The project addresses two societal issues: first, the slow inclusion of highly skilled migrants and refugees into European society and labor market and, second, the demand for STEM and IT-professionals in the increasingly digital labor market.

By implementing a quadruple helix model integrating stakeholders from academia, industry, government, and civil society, the project will develop a model to build inclusive higher education institutions for students with a migration background.

Partners: TUB Technische Universität Berlin, UPM Universidad Politécnica de Madrid
Financing: SEK 3.9 million (INDEK SEK 3.2 million) from EU Erasmus+.

The contribution of foreign-born STEM workers to the knowledge-based economy: Evidence from Sweden

Researchers Hans Lööf

This project studies how foreign-born STEM-workers may contribute to the supply of skills in a knowledge-based economy. Based on Swedish employer-employee data for the period 2011-2015, we investigate whether labor immigrants as well as refugee immigrants are less likely to receive jobs across different STEM occupations than native-born workers. Using wage as a proxy for performance, we also study possible differences between foreign STEM workers matched groups of natives. We consider both average wages and wages along the wage distribution.

Partners: Boston College and Linneus University
Financing: SEK 200,000 from VINNOVA.



Peer Reviewed Publications 2022

Accounting, Finance, Economics, and Organization

- Agrawal, T., Angelis, J., Wiktorsson, M. and Kalaiarasan, R. (2022). Demonstration of a blockchain-based framework using smart contracts for supply chain collaboration. *International Journal of Production Research*, 1-20.
- Baum, C., Löf, H., Stephan, A. and Viklund Ros, I. (2022). The impact of offshoring on technical change: Evidence from Swedish manufacturing firms. *Review of International Economics*, 30(3), 796–818.
- Baum, C., Löf, H., Stephan, A. and Viklund Ros, I. (2022). Innovation by start-up firms: The role of the board of directors for knowledge spillovers. *Research Policy* 51(1), 104-375.
- Brown, J. R., Martinsson, G. and Thomann, C. (2022). Can environmental policy encourage technical change? Emissions taxes and R&D investment in polluting firms. *The Review of Financial Studies*, 35(10), 4518-4560.
- Löf, H. and Stephan, A. (2022). The impact of the Russian-Ukrainian war on Europe's forest-based bioeconomy. *Quarterly Journal of Economic Research* 91(3), 63–82.
- Löf, H., Sahamkhadam, M. and Stephan, A. (2022). Is Corporate Social Responsibility investing a free lunch? The relationship between ESG, tail risk, and upside potential of stocks before and during the COVID-19 crisis. *Finance Research Letters* 46, 102-499.
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- Thulin, P. and Braunerhjelm, P. (2022). Does innovation lead to firm growth? Explorative versus exploitative innovations. *Applied Economics Letters*.

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- Svarts, A., Thorell, A., Engwall, M. (2022) "Volume creates value: The volume-outcome relationship in Scandinavian obesity surgery", *Health Services Management Research*, 35(4).
- Tillberg L, Kaulio M, Tillberg P & Haglund, J (2022) Military competence-in-use in the expeditionary era: Swedish experiences from missions abroad, *Armed Force & Society*, 1–21.
- Wiggberg, M. et al. (2022) "Effective Reskilling of Foreign-Born People at Universities - The Software Development Academy," in *IEEE Access*, vol. 10, pp. 24556-24565.
- Wiggberg, M., Gulliksen, Cajander, Å., Pears, A. (2022) "Defining Digital Excellence: Requisite Skills and Policy Implications for Digital Transformation," in *IEEE Access*, vol. 10, 52481-52507.

Sustainability, Industrial Dynamics, and Entrepreneurship

- Berlin, D., Feldmann, A. & Nuur, C. (2022), "Supply network collaborations in a circular economy: A case study of Swedish steel recycling", *Resources, Conservation and Recycling*, 179, 106112–106112.
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