



# Enabling the Digital Transformation of Small Firms in Sweden

## Entrepreneurial Ecosystem Challenge Mapping and Policy Recommendations

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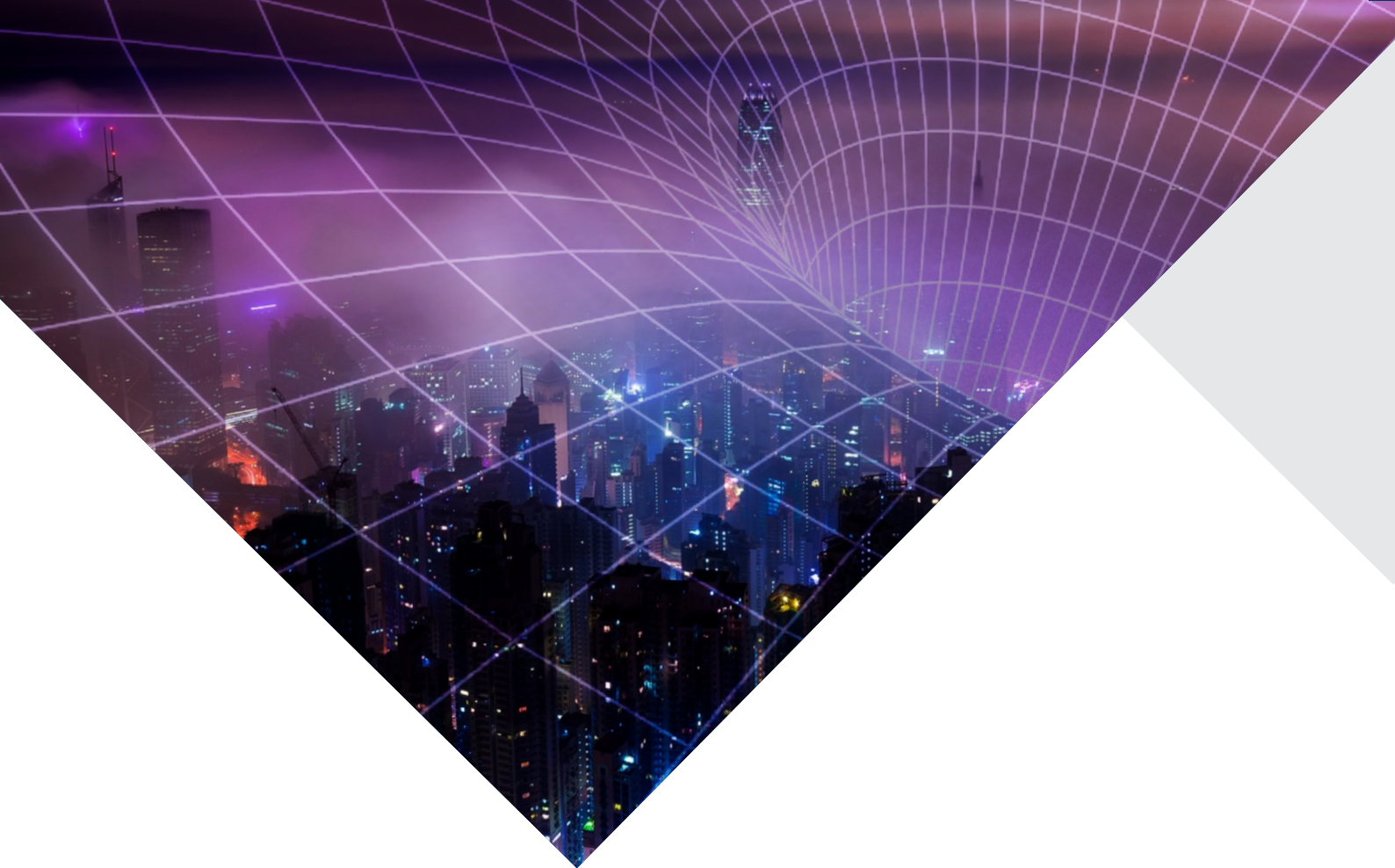
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## Introduction and background

Small firms<sup>1</sup> are regarded as the backbone of the Swedish economy, driving the creation of jobs, shaping economic growth, and fostering innovation. Recent EU statistics show that smaller firms make up approximately 99.8 percent of all Swedish enterprises and generate 51.4 percent of the country's gross domestic product (GDP) (BEUR 119.4). Indeed, they represent the largest share of new job creation in Sweden, accounting for 56.1 percent of job creation in the country. However, small firms are challenged by rapidly changing market and competitive conditions where new technologies and digital business models are disrupting the established order. These firms must, therefore, undergo a fundamental transformation and become more efficient, responsive, and agile in order to remain competitive. In such a scenario, digital transformation presents a vital lifeline to small firms in sustaining their competitive advantage and thriving in the new digital economy.

Digital transformation can be defined as the application of digital innovation leading to new partnerships, structures, values, and business models that change or complement existing organizational arrangements within businesses, ecosystems, and industries. The Internet of things (IoT), 5G, artificial intelligence (AI), cloud computing, and other emerging technologies are the driving forces behind digital transformation, providing opportunities for business innovation and growth as well as the creation of new industrial ecosystem relationships.

It is evident that small established firms in Sweden are expected to greatly benefit from digital transformation. Reports from Boston Consulting Group and PricewaterhouseCoopers claim that digitalization is predicted to increase the operational and production efficiency by 15 to 20 percent and account for more than 20 percent of revenue generation over the next five years. These benefits will become vital for small firms operating in traditional industries in Sweden (e.g., mining, forestry, and manufacturing), where they are in even greater need of digital transformation to improve their internal processes and financial outcomes. Through the adoption and integration of diverse digital technologies, small firms from traditional industries can reduce operational costs, modernize production methods, increase business flexibility, and accelerate

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<sup>1</sup> As defined by the European Commission, a firm is considered small when it has less than 50 employees and has a turnover or a balance sheet equal to or less than €10 million.

joint innovation projects. In some instances, digital transformation has become a contractual necessity for small firms to continue to qualify as sub-suppliers to their larger partners. In fact, digital transformation can be both a source of competitive advantage and a requirement for maintaining competitive parity.

Digital transformation poses unique challenges to small firms (over and above larger enterprises), due to the *liability of smallness* (e.g., size and access to resources) and the *liability of newness* (e.g., legitimacy in the value chain, bargaining power). This behooves small firms to draw on the support of a wide range of external relationships to exploit the benefits of the new digital economy. These relationships can be conceptualized as an entrepreneurial ecosystem, which comprises a diversified group of actors impacting the ability of firms to gain and overcome digital transformation challenges. Usually, an entrepreneurial ecosystem consists of relationships with different actors (including governmental organizations, universities, research institutions, incubators, accelerators, development agencies, and market facilitators) that provide support and enable a focal firm to undertake change. However, it has been reported that most small firms fail to gain support from the other actors in their ecosystems. Thus, to ensure successful digital transformation in small firms, there is a need to better understand the various influencing roles in the relationships that comprise the entrepreneurial ecosystem.

The purpose of this report is to investigate small firms' entrepreneurial ecosystem relationships and their role in enabling the digital transformation of small firms. The report builds on a three-phased approach. During phase one, multiple meetings and workshops were held among team members (representing Luleå University of Technology, Vinnova, Tillväxtverket, and Region Västerbotten) who also participated in the Swedish ministry's high-level group on digital transformation. These interactions focused on defining the scope and target of the study as well as the specific entrepreneurial ecosystem relationships deemed relevant to explore.

In phase two, eight semi-structured exploratory interviews were conducted with expert informants from IUC, Ignite Sweden, Företagarna, AI Sweden, Royal Swedish Academy of Engineering Sciences (IVA), Umeå Biotech Incubator, and ProcessIT. The focus during this phase was to map entrepreneurial ecosystem challenges and develop policy recommendations to support small firms in successfully undertaking the digital transformation. The final phase included validating the findings with representatives who took part in phase one and phase two of the study. The findings of the study have also been presented to the members of the Swedish ministry's high-level group on the digital transformation of Swedish industry, and their feedback has been integrated.

The findings focus on four main types of entrepreneurial ecosystem actors who have the greatest influence on the digital transformation of small firms in Sweden. Funding organizations, large firms, intermediaries, and universities are highlighted as the key actors providing small firms with the necessary resources, knowledge, technological capabilities, legitimacy, and business contacts. Key relation-specific challenges are identified, pointing to the needs and expectations of small firms to gain support from each of these actors. To conclude, recommendations are provided on how policy and industry decision makers can act to mitigate such challenges. As a result, our contribution seeks to support and accelerate small Swedish firms in their endeavors to undertake digital transformation that is both sustainable and competitive.



Summary of main challenges and recommendations for each relationship.

## Funding organisations

Funding organizations refer to the Swedish and European government agencies and other financial institutions (e.g., banks) that provide financial and non-financial support in the form of state funding, access and advisory for research and development (R&D), and the promotion of entrepreneurship and growth. Examples of funding organizations include Vinnova, Tillväxtverket, Formas, financial institutions (SEB, Swedbank), and EU funding programs.

Funding organizations can contribute to the digital transformation of small firms by providing the resources needed to drive innovation, create synergies between funding programs, and legitimize industry collaborations. However, we identify three key reasons why the potential of small firms to gain from this relationship has been limited, and we provide recommendations on how to mitigate the challenges.

### 1. Benefiting from diverse financial services and support programs

Most small firms have limited contact with funding organizations at regional, national and EU levels. This limits the flow of information and resulting insights into the different types of financial services and the eligibility criteria needed to access funding programs that support digital transformation. Furthermore, small traditional firms usually find specialized digital transformation programs on AI and IoT of low business value. Thus, small firms are uninterested in joining the popular funding support programs.

*“In regard to funding or money [...] there are, in my experience, very few selected [small traditional firms] that actually access them. I think that the problem most small traditional firms have is that they lack understanding about the scope of different funding opportunities. I think this is the biggest hurdle for them because they have no connection with or very little connection with the funding ecosystem actors.”*

**Expert informant – Industrial network**

### 2. Untangling the difference between national and regional funders

Small firms struggle to understand the differences in financial support available between regional (e.g., Region Norrbotten) and national funders (e.g., Vinnova). In particular, when it comes to support for digital transformation, national funders are typically more inclined to support larger cooperative-funded projects than smaller regional funding opportunities. It is not easy for small firms to differentiate between various types of funding actors when it comes to the requirements needed to access funding. Furthermore, national and regional funders often revise the requirements and rules of funding, which presents small firms with the challenge to keep pace with the latest information.

*“In Sweden for example, [traditional] small firms are often five persons or less. However, the majority of regional and/or national funding programs favour larger firms, so they do not understand the challenges facing these small firms when it comes to developing rules and funding from the government. In most cases, small firms do not even know the difference between regional funding and funding from national-level organizations. Also, sometimes they are not well-tailored to fit these companies.”*

**Expert informant – Industrial network**



### 3. Complexity of the EU application and funding process

Small firms experience ambiguity and are given to misinterpretation over the terms and conditions of EU funding documents. Besides undertaking a time-consuming application process, small firms report long delays between approval and receipt of payment from EU projects. This tends to be the case because most EU programs are designed for administered payment, which requires proof of costs with no advance payments. Thus, this poses difficulties for small firms with limited working capital.

*“The EU is clearly convinced that small firms need to undertake digital transformation, but the administrative processes have made it complicated for small firms to gain funding. [...] There is a lot of potential for improvements in this direction, but funding processes are not small firm friendly. [...] When it comes to paperwork and documents, I think many times, it is too complicated.”*

**Expert informant – Industrial network**

**Recommendation 1:** Empower financial organizations to provide additional funding support that addresses digital transformation needs and increases the capacity of small firms. A concrete example is where national banks and/or ALMI could use an approved EU project as leverage to provide low-interest loans so that small firms can abate cash flow and investment issues.

**Recommendation 2:** Encourage national funders to have dedicated personnel who can provide advisory support to small firms in Sweden on the most suitable funding opportunities to suit their business profiles and unique needs. For example, Tillväxtverket should ensure that verksamt.se provides easy access to up-to-date information on available programs, including regional initiatives. Another example would be to ensure that banks become formal funding information providers, given that they represent the regular day-to-day contact with small firms and already provide them with some financial advice.

## Large firms

Large firms refer to private organizations whose staff headcount is at least 250 employees and whose turnover is more than SEK 500 million. Examples of large firms include ABB, Scania, and Boliden.

Large firms can contribute to the digital transformation of small firms, who are often their sub-suppliers. Thus, the digital transformation of small firms is directly or indirectly influenced by the digitalization decisions that larger firms make, such as investment in certain production technologies and logistic systems. However, we identify some areas where the potential of small firms to fully leverage this relationship has been compromised, and we provide recommendations on how to mitigate the associated challenges.

### 1. Engaging with internal stakeholders within large firms

Small firms struggle to identify the right internal representative in large firms who have the knowledge or authority to influence digital transformation decisions. This lack of contact and communication with appropriate stakeholders challenges the ability of small firms to establish a supportive relationship with larger firms and to facilitate efficient digital transformation.

*“SMEs often struggle to find an appropriate speaking partner when they approach large firms with any request related to digitalization. This is not surprising as they have so many different digital transformation initiatives on-going simultaneously across the organization.”*

**Expert Informant – Corporate intermediary**

### 2. Understanding large firms' views on digital transformation

Small firms are often unaware of the vision and digitalization goals of large firms. Since large firms are concurrently engaged in their own internal digital transformation, they are reluctant to discuss or disclose their digital ambitions with small firms. This creates ambiguity and uncertainty in their relationship, leading to small firms being blind-sided over evolving digitalization requirements and mandates.

*“Not many large companies have clear and documented visions, missions, goals, or strategies for digital transformation. This creates a lot of unclarities for sub-suppliers as they need to comply with evolving and changing digitalization expectations.”*

**Expert Informant – Industrial network**



### 3. Compelled to follow large firms' demands due to power imbalances

Small firms are vulnerable to adverse behaviors from large firms related to digital transformation requirements. Larger firms can impose demands and influence the adoption by small firms of certain preferred technologies, related to logistics, payment, operations, and so on. These situations demand that small firms follow the declared wishes of large firms or risk losing their position to a competing sub-supplier. This leads to small firms locking in to the favored technologies and systems of large firms without undertaking a deeper analysis of the implications for their own internal digital transformation. Moreover, since small firms often conduct business with many large firms, they are forced to invest and make choices on digital technologies, systems, and tools in ways that are often conflicting.

*"It is a bit tricky when small firms work with digital transformation because larger firms set the rules and demands on technology and systems. This means that small sub-suppliers need to follow and adapt to the wishes of larger firms."*

**Expert informant – Industrial network**

**Recommendation 1:** Encourage larger firms to openly communicate about their internal digital transformation programs and projects with existing and potential supply chain partners, which often include small traditional firms.

**Recommendation 2:** Provide regional municipality actors (e.g., Näringsliv kontakt) with the mandate to orchestrate collaborative environments that encourage dialogue on digital transformation between large and small firms on the local and regional levels. For example, Skellefteå municipality organizes events that bring together several large and small firms to encourage collaboration and communication so that the power gap between these actors is suitably reduced.



## Intermediaries

Intermediaries refer to independent or industry network actors who support small firms in achieving growth, innovation, transformation, and access to industry contacts. Examples of intermediaries include industry development organizations, such as IUC, ALMI, and Ignite Sweden.

Intermediaries can contribute to the digital transformation of small firms by providing networking opportunities, supporting digital transformation activities, and offering business advice and mentoring. However, we highlight three key areas where the potential of small firms to gain from this relationship has been limited, and we provide recommendations on how to mitigate the challenges.

### 1. Complexity of providing customized support and advisory services

Intermediaries face challenges in tailoring their support services to a diverse set of small firms with unique needs and operational contexts. Despite belonging to the same category, small firms display significant heterogeneity with regard to their size, age, and resource base. Therefore, customizing digital transformation support to accommodate the needs of each firm incurs substantial costs and complexity. Delivering such tailored support at scale represents a significant challenge for intermediaries who are themselves constrained by the resources they have at their disposal.

*“We have trained frontline staff in providing specialized advisory to small firms. But this is not an easy undertaking as we are trying to create and offer services that are scalable and standardized for many industrial partners. Companies differ from each other, their needs are different, so we need to adapt our solutions to various conditions and that is very complex.”*

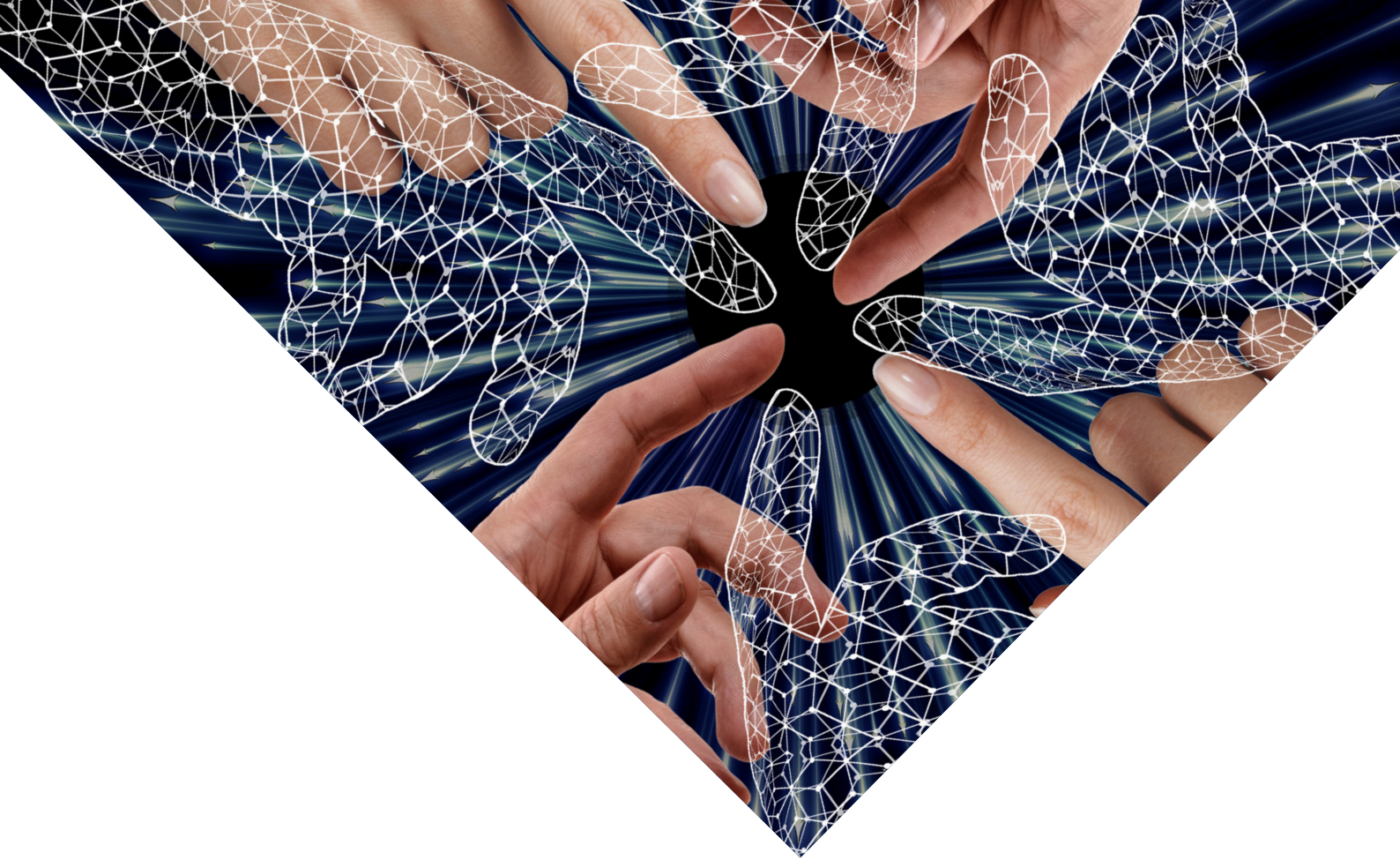
**Expert Informant – Industrial network**

### 2. Lacking advisory for different stages of digital transformation

Small firms' digital transformation should be viewed as a journey that spans many years. This means small firms' needs differ according to their digital maturity and stage of transformation. Intermediaries' support tends to focus mainly on the initial stages, leaving small firms without adequate follow-up to ensure successful digital implementation through the later stages.

*“We are most active with small firms during the initial phase of their transformation. We can coach them about the digital transformation requirements and guide them on certain investment decisions. But after the initial stage of transformation, they require more advanced support, and these kinds of framework are currently lacking within our and other intermediaries' organizations.”* Expert Informant – industrial network

**Expert Informant – Industrial network**



### 3. Going beyond networking activities

Intermediaries excel at organizing networking events for small firms to engage and connect with other industrial actors. Such networking events hold value, especially when different firms share the learning and experiences garnered from their specific digital transformation. However, small firm managers are increasingly cautious about investing their limited time and resources in such events and often question the value of such engagements.

*“We have conducted a few studies with SMEs and asked them why they do not seek support from us [intermediaries]. The most common answer is that they do not understand the value of such cooperation for their business growth and joining broad networking events create marginal business value for them. So, it is a problem that SMEs do not perceive us as valuable enough.*

**Expert Informant – Engineering academy**

**Recommendation 1:** Encourage intermediaries to establish closer and stepwise guidance for small Swedish firms at different stages of their digital transformation. Providing the right advisory and mentoring services at different stages of their journey can have an exponential impact on the subsequent stages of firms’ digital transformation..

**Recommendation 2:** Secure long-term funding for the intermediaries to ensure the quality and the reach of their support for small firms. These organizations currently lack appropriate levels of funding and are dependent on short-term project funding. This limits their commitment to customized digital transformation support programs for small firms.

## Universities

Universities are higher education institutions that conduct teaching, research, and grant academic degrees in various academic disciplines. Examples of Swedish universities include Luleå University of Technology, KTH Royal Institute of Technology, and Lund University.

Universities can contribute to the digital transformation of small firms by educating the next generation of the digital workforce, managing joint collaborative projects between ecosystem actors, and researching new technological applications. In the following segment, we identify where the potential of small firms to gain from this relationship has been limited, and we provide recommendations on how to mitigate the challenges.

### 1. Flexible education for small firms' employees

Universities are primarily geared to providing educational programs for students. Most universities do not lay much stress on executive or professional programs (e.g., remote courses with flexible hours), such as those that target small firm managers without requiring them to enroll in full-time programs. Moreover, universities currently lack a modular and flexible approach to education programs on digital transformation that are better suited to small firm managers and employees.

*“Academia must get more hands-on. They need to address the challenges the [small firms] really have. [...] They have the low-hanging fruit, they have already established contacts, and have stakeholders at [large firms]. But they still need to be educated when it comes to these new and trendy concepts like digitalization. However, usually the managers do not have the time to attend long formal learning programmes, so probably something flexible could work here.”*

**Expert informant – Industrial network**

### 2. Unexploited potential of students' collaboration

Small firms experience difficulties in benefiting from student cooperation when considering organizational changes, such as driving digital transformation. This represents a lost opportunity to enable mutual learning between students and small firms because educational programs and courses can train and prepare students to become agents of change in small local firms. Moreover, university education courses seem to be biased toward engaging with tech companies and larger companies, while small traditional firms are seen as unattractive for course and project work.

*“Often when universities are involved, it gets very academic, and the small companies feel that the scope of engagement becomes too broad and generic. So, they often say that “We don't have time for this.” On the other hand, it is also about students. Often, they are keener on finishing their education and join one of these high-tech giants or digital start-ups. It is rare to find a student who says that he or she wants to be a change leader, promoting change in his/her small business or help these small firms with their transformation and growth.”*

**Expert Informant – Industry collaboration center**



### 3. Synergies between industry and academia

Small firms take a commercial view while universities adopt a research-oriented perspective. This dichotomy creates a challenge in trying to find collaborative programs where universities provide business-oriented advisory to small firms that can address their current digital transformation needs. Moreover, universities often tend to be discipline specific and unable to provide technical and organizational research support in a common cooperative endeavor to achieve digital transformation.

*“If we are to enhance understanding about the [small traditional firms] situation or industrial perspective in the university, we need to open the doors between them. [...] we need to cooperate more with academia. Open up for that, or sabbaticals within the industry or whatever so we can get more of that perspective into the university.”*

**Expert Informant – Regional Incubator**

**Recommendation 1:** Allocate directed professional education funding to prioritize close engagement between students and local small firms. Digital transformation educational programs, such as AI, machine learning, and IoT, can deliver specific targets to increase practical learning and promote interaction between university students and industry.

**Recommendation 2:** Design short-term online courses and executive education on specialized digital transformation topics for small firm managers and employees. To do so, universities could cooperate with intermediaries and industry networks to contact small firms that fit such programmes and engage with them rather than passively wait for small firms to contact them.

# Conclusions

The digital transformation of small firms is expected to open promising paths to accelerate economic growth in traditional Swedish industries. Innovative technologies and their applications have the potential to provide small Swedish firms with competitive advantages to thrive in the new digital economy. However, to ensure that these opportunities materialize, small firms require the collaboration of a wide variety of actors. Current and new entrepreneurial ecosystem relationships must adapt to the emerging needs of small Swedish firms to succeed at each stage of their digital transformation.

This report has highlighted the specific challenges to the ecosystem relationship that small Swedish firms face in relation to funding organizations, large firms, intermediaries, and universities. Recommendations on how to address these challenges have been provided to contribute to the progress of small Swedish firms engaged in digital transformation. This report seeks to stimulate reflection and to prompt action from within and beyond entrepreneurial ecosystems to accelerate the digital transformation of small Swedish firms.



## About DigIn Center



The DigIn Center is the Center for Digital Innovation of Business Models in Industrial Ecosystems at Luleå University of Technology. The purpose of the center is to develop, test, disseminate, and commercialize methods for digital business model innovation in Sweden and in global industrial ecosystems.

To obtain more information on DigIn or to contact one of our researchers, please refer to our webpage:



Alternatively, you can follow us on LinkedIn:



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