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Towards a better, smarter society

An overview of Industrifonden's
investment approach

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About Industrifonden

Industrifonden sees today's science and groundbreaking technologies as the foundation for the industries of tomorrow. That is why we seek out the most transformative ventures to invest in. Those with the power to change the way we live for the better and those that have a real, meaningful impact on society.

We partner with entrepreneurs, innovators, and scientists whose discoveries are laying new ground for our future – for industries that may not even exist yet. We invest in early growth stages, seed to A-round funding. Initial investments are typically 10-50 million SEK, but we have the power to invest considerably more during our holding period.

We believe in being an active investor; in sharing our 40 years' experience of scaling and growth. However, we do not take an operational role in our portfolio firms.

Our portfolio of companies spans the Nordics, but all have a Swedish connection.

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Introduction

“Schumpeter strongly distinguished innovation, seen as the commercial introduction of a new product or a ‘new combination’, from invention, which belongs to the realm of science and technology. Indeed, the space of the technologically possible is much greater than that of the economically profitable and socially acceptable. It is with profit in mind that entrepreneurs and managers are constantly turning inventions into innovations, technical possibilities, and discoveries into economic realities. In turn, through their investment and funding decisions, they can also steer research efforts in particular directions.”¹

It has become something of a cliché to say that the world is going through a period of unprecedented change—potentially making the world a better place, but the risk exists that these shifts might go the wrong way. The rise of technology has already revolutionised the lives of many—creating new livelihoods, extending lifespans through better access to healthcare, and even entertaining us through better access to the arts. This technological revolution, however, is shaped by decision-makers: how, and by whom, increasingly impactful technologies are used has implications for us all.

Industrifonden has long invested in Swedish technologies and young tech ventures that enable and accelerate the advancement of Swedish society, making Sweden smarter. Today’s pace of innovation makes our long history of investing—and mandate to invest “for the good of Sweden”—even more important. We invest in three main kinds of new ventures: those in Deep Tech, which involves the commercialisation of groundbreaking new technologies; Transformative Tech, which accelerate or herald new industries and social changes through innovative business models; and Life Sciences, which includes pharmaceuticals, health technologies, diagnostics, and e-health. At the core of these areas of investment is the belief that the right social and technological advances can make Sweden a smarter and more competitive country.

The overarching mission of Industrifonden is to support the development of Sweden’s industrial and societal strengths by:

- Taking calculated risks for the good of Swedish society;
- Investing with the long-term good of the society in mind; and
- Supporting new firms as they improve on and commercialise scientific and applied research.

Here, we outline why we make the choices that we do, and how our investment decisions support these goals. What distinguishes us from other venture capital (VC) firms is that we 1) prioritise social returns, 2) try to overcome information problems, 3) invest with a longer-term perspective, given also that we are a reinvestment fund, and 4) have the freedom to invest without deference to external investors.

¹ Perez 2010

The goal: a society that is both smart and good

Sweden is a unique society in that we, compared with many other countries, have experienced economic stability and a strong economy over a fairly long period. Successive generations have therefore grown up both economically and physically secure. This long period of economic and physical security² has not only led to further economic growth,³ but also improved access to better education and an expansion of the public social insurance system,⁴ as well as taxpayer-funded investment in basic research, diversification in the economy on the macro level, improvements in productivity, and overall improvements in quality of life, for instance lower infant mortality rates,⁵ and a higher standard of living.⁶

There is empirical evidence⁷ to suggest that economic and physical stability is not only correlated with increased life expectancy, literacy, and income, but also with a rise in inclusive and “modern” norms, for instance freedom of speech, tolerance of minorities, and gender equality. There is also evidence to suggest that economic insecurity has the opposite effect.⁸

Preconditions

Sweden already has a well-educated workforce, and invests more than most countries, including the rest of the European Union and the United States, in both university research and industrial research and development (R&D).⁹ Even so, the European Innovation Scoreboard¹⁰ points to weaknesses in our ability to take innovations to market (sales of new-to-market and new-to-firm product innovations are low) and for firms to attract private financing. These weaknesses in bringing innovations to market are echoed by the Global Innovation Index.¹¹

Research into private VC has suggested that state investment encourages private investment, typically through investment syndication that spreads risk.¹² However, too much state investment—or investment of the wrong form—may crowd out private investment or discourage innovation by making it too easy to obtain venture financing. Non-private investors therefore must be careful when investing that they either perform a role that private investors are not willing to perform, or that they remedy market inefficiencies in their strategy.

² Unusually, for Europe, this long period extends to the late 1800s, not just World War II

³ In the mid-1800s, Sweden’s average income level was close to the average global level, but by the 1970s, the average income level was more than triple the global average and among the highest in Europe, Maddison 2006

⁴ This began with the expansion of social insurance, and ultimately has evolved into a welfare state comprised of a mixture of private and public solutions with collective agreements negotiated by the labour-market organizations, see Lundberg & Åmark 2001.

⁵ Chung & Muntaner 2007.

⁶ In the absence of clear measures of wellbeing or satisfaction, both GDP per capita, and self-reported satisfaction are often used.

⁷ See Inglehart 2018

⁸ Wroe 2016 and Billiet, Meuleman & De Witte 2014.

⁹ World Bank data

¹⁰ European Commission 2020

¹¹ Dutta, Lanvin & Wunsch-Vincent 2020

¹² Lerner & Watson 2008

What is Industrifonden's strategy?

Groundbreaking realisations and discoveries seldom lead to immediate value creation. Normally, they are improved through practical innovation in order to reach their full potential. Baumol points to the steam engine and the computer as examples: in both cases many years of development were needed before these innovations broke into commercial relevance. It is Industrifonden's strategy to look for, and fund, the groundbreaking technologies of the future—particularly when they are likely to lead to significant industrial and social breakthroughs. While the primary goal is to make Sweden a better—and smarter—place, the fact that Sweden is a small, export-led nation will likely mean that our investments enhance our competitiveness internationally, and will have impact beyond our borders too.

Supporting, catalysing, and accelerating paradigm shifts

These industrial and social breakthroughs can best be understood through the lens of what economic historian Carlotta Perez calls shifts in the “techno-economic paradigm”.¹³ These new paradigms make societies more productive, and usher in new industries and ideas in society. Sweden could not, for instance, initially make the most of either electrification or discoveries like the diesel engine or the telephone because there were few commercial activities that made use of them at first. Today, of course, we cannot imagine life without them. But it took time to get to this point—and the importance of these technologies, and the size of their effects in time, could not be foreseen at first.

Looking for the potential for paradigm shifts first, and then looking for firms that realise innovations that promote these shifts is what sets Industrifonden apart from other VC firms. Other VC firms look to allocate their capital most effectively: by providing financing to both firms and industries that are expected to have high returns and withdrawing capital from firms and industries with poor prospects.¹⁴ The dominant view in many financial circles is that effective allocation of capital promotes economic growth¹⁵ and higher productivity growth. However, capital allocation models are based on private rates of return which do not account for (admittedly hard-to-measure) social returns on investment.

However, this model of investment rests on the assumption that there is enough (market) information for a capital allocation model to make a market assessment. When it comes to immature technologies, there often are information asymmetries, a lack of information, or even just lack of understanding about a technology for a VC firm to apply a capital allocation model.¹⁶ Thus, it is hard for them to assess market risk because of the significant technological risk involved. This preference for verifiable market risk is further compounded by a desire to invest in areas in which VC firms have previously had success, and the GP-LP relationship which prioritises short-term gains. Both limitations on the typical VC model means that firms miss out on investing in things that are outside of their areas of prior experience. And, of course, as truly

¹³ Perez 2010

¹⁴ Wurgler 2000

¹⁵ E.g. Levine & Zervos 1998, and Beck, Levin & Loayza 2000

¹⁶ Landström 2007.

groundbreaking innovation may be hard to see at first (due to information problems), the timing may not be perfect and involve a break from prior ways of doing things.

Social returns, despite information problems

Social returns, as the name suggests, are when society benefits. The core difference between social returns and private returns is primarily about who benefits. Private returns prioritise benefits for a single firm or individual, although this need not come at the expense of social returns. Industrifonden looks to invest in ways that prioritise social returns, although private returns are an important part of making sure that the fund continues to exist. The social returns we focus on are linked to the technological advancement of society, the transfer of intellectual advances, and the competitiveness and sophistication of the Swedish economy.

This mandate to invest with social returns as an aim stems from Industrifonden's establishment in the 1970s: as an independent foundation, with no owners or shareholders, and with the goal of investing in the best interests of the country. Academic studies¹⁷ have examined these social returns and found that the typical VC model risks investing in risk-averse ways that prioritise private returns.

Investing with social returns in mind includes investing in young firms and immature technologies. Not only do they generate innovation and form a vehicle for the commercialisation of academic and spun-out research, but they also support the development of skills and the development of prototypes related to the immature technologies they work with. They thus not only bring new products, services, and innovations to market, they also facilitate increased understanding of immature technologies in the wider market. One of the reasons why these young firms and immature technologies struggle to attract the attention of other VC firms is to do with information problems: their potential is hard to demonstrate. In the short term, syndicated investment together with other private investors may allow those private investors to invest despite these information problems. In the long term, investment in immature technologies allows them to survive long enough to generate the information needed to attract subsequent investors.

This approach, of overcoming information asymmetries, also has its basis in economic history: the economist Marianna Mazzucato argues that for much of the past 200 years, fundamental technological breakthroughs didn't just have their basis in publicly financed basic research, but that the additional steps needed to make such research applicable was initiated by the state.¹⁸

Sweden's impressive growth over the last 100 years—and between 1950 and 1970, in particular—was influenced by its ability to take advantage of technological and organisational advances made in Western Europe and North America.¹⁹ This suggests that advances made in Sweden could be used to improve conditions elsewhere in the world. This might be through

¹⁷ E.g. Cumming & Johan 2019

¹⁸ Mazzucato 2013

¹⁹ Schön 2008

technological convergence that allows other (lower income) countries to increase their growth at a faster rate,²⁰ or global sales and relationship-building.

²⁰ E.g. Lee & Lim 2001.

How Industrifonden operates

Many of our activities are normal VC activities and are reminiscent of what other VC investors do. We look for and evaluate new possible investments, we make investments, and we help develop firms with an eye to public listing or buy-out. What distinguishes us from other VC firms is that we 1) prioritise social returns, 2) try to overcome information problems, 3) invest with a longer-term perspective, given also that we are a reinvestment fund, and 4) have the freedom to invest without deference to external investors.

How do we do this? The first is by employing investment professionals with specialised profiles in the areas of technology development that are the most ground-breaking, and many of our investment professionals have PhDs in the areas in which they invest. Our investment areas include Deep Tech, Transformative Tech, and Life Sciences.

Investment Professionals with specialised profiles

Deep Tech

Our Deep Tech team are experts in new and emerging technologies. Deep Tech has become an established notion used to describe technologies that are research intensive, high risk, typically take a long time to come to market, and which have the potential to make considerable impact. These include information technologies, new materials, automation, and robotics, among others.

Life Sciences

Our Life Sciences team support the commercialisation of products and services, grounded in solid science, which convincingly address an unmet medical need, and where we also see a willingness to pay for innovation that makes a clinical difference. We have expertise in biotech, medtech and healthtech.

Transformative Tech

Our Transformative Tech team focus on technology use that ushers in new industries and ideas in society and improve quality of life. Ventures in this area typically employ innovative business models or combinations of technologies to accelerate or initiate a paradigm shift. Ultimately, transformative tech leads—or is intended to lead—to transformation in industries, markets, and society.

Clear causal objectives, even as some effects are indirect

One of the challenges associated with pursuing social returns is that they are typically hard—or expensive—to measure. Industrifonden therefore takes a two-pronged approach to making sure that the firms that we invest in know what to expect from us, and that we can measure their effects down the line.

This measurement can be thought of as a matching problem: how do the actual results measure up against the intended results? The different intended results and actual results are summarised in Table 1.

	Evaluated at the point of investment	Evaluated at a later stage
1	<p>Intended Input The anticipated resources, including both financial and human resources, needed for the venture to realise its goals.</p>	<p>Actual Input The actual resources that have been employed by the venture up until that point.</p>
2	<p>Intended Activities The anticipated activities that the venture will pursue to realise its goals.</p>	<p>Actual Activities The actual activities that the venture has engaged in. Importantly, these are likely to have evolved over time as market conditions evolve.</p>
3	<p>Intended Output The intended direct output of the venture, for instance a product, service, or new vertical.</p>	<p>Actual Output The venture’s actual output in the form of products, services, and related material (including marketing materials, for instance).</p>
4	<p>Intended Broader Outcome The intended outcomes of the venture’s activities, and its commercialisation process, for instance among its direct stakeholders and industry.</p>	<p>Actual Broader Outcome A venture’s actual outcomes among its direct stakeholders and industry.</p>
5	<p>Intended Broader Benefits The intended benefits of the venture’s activities and outputs for the society at large, for instance by changing norms or revitalising industries. These might be thought of as (both positive and negative) externalities.</p>	<p>Actual Broader Benefits The actual benefits, or externalities, of the venture’s activities and outputs. Like activities and outcomes, these are likely to evolve over time—and be hard to pin down or measure causally.</p>

Table 1: Measuring intended and actual results

Crucially, rows 1-3 can be measured causally—and are typically measured in venture capital. However, 4 and 5 are what set Industrifonden apart but would be very expensive to measure causally. We therefore look for correlations between our work and existing indices, for instance the Economic Complexity Index,²¹ and rely on individual case studies evidence to ascertain whether our intended broader outcomes and benefits are realized. These have included climate-smart food production (Oatly), new manufacturing methods (Arcam), or digital technologies (Qlik), and we look at how these firms have contributed to developing their respective industries.

We pursue the formalisation of these investment objectives, even though we do not have outside shareholders, for the following reasons:

²¹ Hidalgo & Hausmann 2009

The first is *consistency*: to be consistent in what, and how, Industrifonden invests, clear objectives need to be set *ex ante*. These create a standard that improves and streamlines deal flow (by making expectations clear, it takes less time to come to agreement).

The second is *accountability*: Although a foundation like Industrifonden does not have outside shareholders to which it has to account, as a state investment entity it is still accountable to the public. Having clear, *ex ante* metrics—and a measurement of how they are fulfilled—shows how Industrifonden creates value, in the eyes of the sceptical public and demonstrates its commitment to social effects, in addition to financial ones.²²

The last is *credibility*: Aside from the public, Industrifonden also competes with (and collaborates with) other investors when it comes to investing in commercialising the most promising innovations. Having a clear set of measurements in place creates credibility both in the eyes of nascent ventures, but also in the eyes of potential investing partners.

In the move towards taking calculated risks for the good of Swedish society, by investing in firms as they improve on, and commercialise, scientific and technological research, we understand the objectives of Industrifonden as being both social and financial. Financial, for the long-term sustainability of the fund, and social for reasons related to why it was established in the first place.

²² O'Flynn & Barnett 2017

Investments that bridge a gap

Since WWII, a large gap has arisen between, on the one side, basic research, and on the other side industrial technological development, including here in Sweden. Given the complexity of advanced economies, bridging this gap requires a concerted effort. As international metrics show, Sweden punches above its weight when it comes to research—but could do better when it comes to commercialisation and the realisation of this research.²³ It is in the funding gap between academic research, and product development and commercialisation that Sweden risks missing the boat on, for instance technologies like AI, new materials, and breakthroughs at the interface of biology and IT.

The insight that there is a strong connection between technological progress and economic prosperity has been around for a long time. Once researchers thought that the mere introduction of a new technology would lead to economic and social improvements, or what are also called paradigm shifts. However, already in the 1950s,²⁴ the observation was made that growth in inputs (labour force, investment in machinery) could only account for about 15% of the actual growth in the output of the US economy between 1870 and 1950. Eighty-five percent of the growth of the US economy at the time could not be explained. Increasingly it is not just the technology that leads to a paradigm shift, but how it is used and commercialised. In other words, the difference between invention and innovation.

It is in firms built upon novel and creative commercialisation of inventions that Industrifonden invests. Firms' commercialisation of inventions and innovations allows them to cooperate and complement existing firms. The long-term intended outcomes and benefits of our work are a more sustained, competitive, and future-oriented Swedish economy, and thus a stronger society. In the long term this means that more resources are available for building a modern society and a better Sweden.

Sweden is a great country to live in. One of the pre-conditions for maintaining this is that we constantly develop our industrial strengths by improving on what we know, and our ability to take advantage of new science and technology, both in practice and through commercialisation. To contribute to this is the core of what Industrifonden works with—to strengthen Sweden's ability to take advantage of and apply new and sustainable technologies. We do this through supporting new ventures that not only advance and accelerate paradigm shifts and focusing on making Sweden—and the world—a better place.

²³ European Commission 2020

²⁴ Abramowitz 1956

References

- Abramowitz, M. 1956. Resource and output trends in the United States since 1870. *American Economic Review*, 46: 5–23.
- Billiet, J; Meuleman, B; and De Witte, H. (2014). The relationship between ethnic threat and economic insecurity in times of economic crisis: Analysis of European Social Survey data., *Migration Studies* 2(2): 135–161.
- Beck, T., Levine, R., & Loayza, N. (2000). Finance and the Sources of Growth. *Journal of financial economics*, 58(1-2), 261-300.
- Chung, H., & Muntaner, C. (2007). Welfare state matters: a typological multilevel analysis of wealthy countries. *Health policy*, 80(2), 328-339.
- Dutta, S., Lanvin, B. & Wunsch-Vincent, S. (eds) (2020) Global Innovation Index 2020. Available at: https://www.globalinnovationindex.org/userfiles/file/reportpdf/GII_2020_Full_body_R_58.pdf
- Cumming, D. & Johan, S. (2019) Government venture capital research: fake science and bad public policy, *Venture Capital*, 21:1, 121-131
- European Commission (2020) European Innovation Scoreboard. Available online at https://ec.europa.eu/growth/industry/policy/innovation/scoreboards_en
- Hidalgo, C. A., & Hausmann, R. (2009). The building blocks of economic complexity. *Proceedings of the national academy of sciences*, 106(26), 10570-10575.
- Inglehart, R. (2018). *Cultural evolution: people's motivations are changing, and reshaping the world*. Cambridge University Press.
- Landström, H. (Ed.). (2007). *Handbook of research on venture capital*. Edward Elgar Publishing.
- Lee, K., & Lim, C. (2001). Technological regimes, catching-up and leapfrogging: findings from the Korean industries. *Research policy*, 30(3), 459-483.
- Lerner, J., & Watson, B. (2008). The public venture capital challenge: the Australian case. *Venture Capital*, 10(1), 1-20.
- Levine, R., & Zervos, S. (1998). Stock markets, banks, and economic growth. *American economic review*, 537-558.
- Lundberg, U., & Åmark, K. (2001). Social rights and social security: The Swedish welfare state, 1900-2000. *Scandinavian journal of history*, 26(3), 157-176
- Maddison, A. (2006) *The World Economy*, Volumes 1 and 2. Paris: OECD
- Mazzucato, M (2013) *The Entrepreneurial State: Debunking Public vs. Private Sector Myths*, London: Anthem Press
- O'Flynn, P., & Barnett, C. (2017). Evaluation and impact investing: A review of methodologies to assess social impact. Available online at https://opendocs.ids.ac.uk/opendocs/bitstream/handle/20.500.12413/12835/ER222_EvaluationandImpactInvestingAReviewofMethodologiestoAccessSocialImpact.pdf?sequence=1
- Perez, C. (2010). Technological revolutions and techno-economic paradigms. *Cambridge journal of economics*, 34(1), 185-202.
- Schön, L. (2008) Sweden – Economic Growth and Structural Change, 1800-2000 in *EH.Net Encyclopaedia*, edited by Robert Whaples. URL: <http://eh.net/encyclopedia/sweden-economic-growth-and-structural-change-1800-2000/>

World Bank (no date). Research and development expenditure (% of GDP). Available online at <https://data.worldbank.org/indicator/GB.XPD.RSDV.GD.ZS?locations=SE-US-1W-EU&start=2006&end=2015>

Wroe, A. (2016). Economic Insecurity and Political Trust in the United States. *American Politics Research*, 44(1), 131–163

Wurgler, J. (2000). Financial markets and the allocation of capital. *Journal of financial economics*, 58(1-2), 187-214.



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