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POLICY BRIEF

**HOW TO BRIDGE THE GAP BETWEEN PRIVATE AND PUBLIC R&D FUNDING IN
NORWAY**

PREPARED FOR THE NORWEGIAN RESEARCH COUNCIL

Anna Baturevich (Stockholm School of Economics)

Eduardo Hernández-Rodríguez (Utrecht University)

Stefan Apostol (University of Pécs)

Barbara Waloszek (University of Stavanger)

Eristian Wibisono (University of Pécs)

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Synopsis

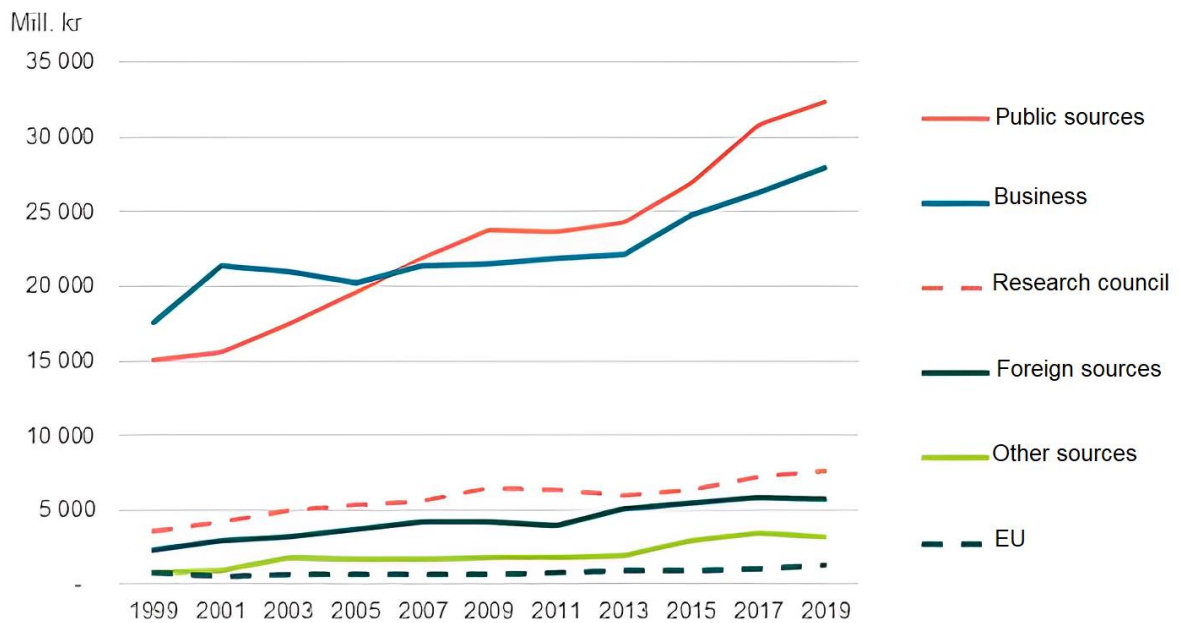
This policy brief highlights the current state of research and development (R&D) funding in Norway. Despite significant growth in public funding in recent decades, the potential for further expansion is limited. To advance technological progress and economic growth, there is a need to mobilize private capital. One proposed method for boosting private R&D spending involves transitioning from the triple-helix model of university-industry-government collaboration to quadruple-helix cooperation, which would incorporate civil society. The authors recommend establishing a government-backed venture capital fund as a promising first step towards realizing this goal. This public-private partnership would concentrate on supporting early-stage, R&D-intensive firms and targeting underrepresented R&D sectors. The proposed venture capital fund aims to enhance private sector participation in R&D, encourage the growth of R&D-intensive firms, and foster favorable conditions for quadruple-helix cooperation by uniting government, industry, academia, and civil society towards shared objectives. Ultimately, the authors assert that initiatives such as these are necessary to advance technological development and stimulate economic growth in Norway.

CURRENT STATUS

Public funding of research and development (hereinafter R&D) in Norway has increased significantly over the last decades. In this sense, there is a goal of achieving 3% of the national GDP invested in R&D. Norway's high proportion of publicly funded R&D stands out internationally, reaching 46% of all R&D spending in 2020.

Figure 1: Total R&D expenditures by source of funding (1999-2019).

Notes: In millions of NOK (vertical axis).

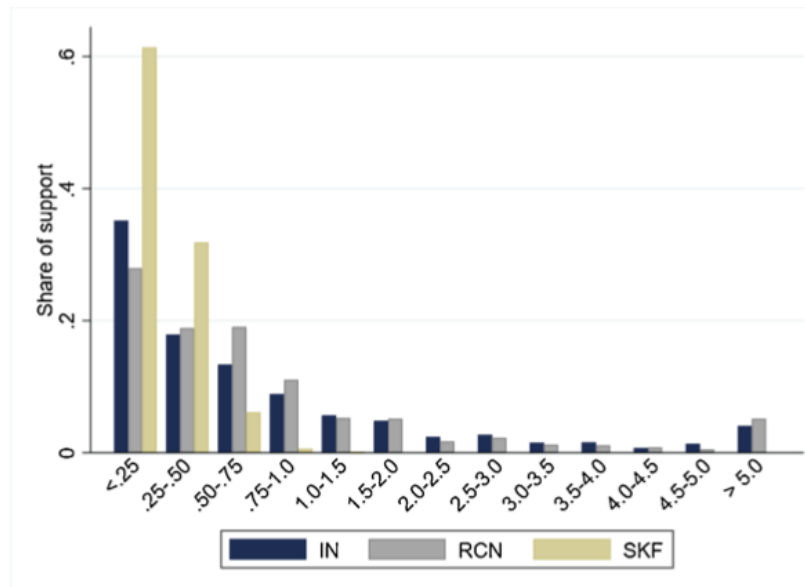


Source: the Research Council of Norway.

The **Research Council of Norway** (herein RCN) is one of the three key governmental institutions alongside Innovation Norway and Skattefunn. Skattefunn offers indirect support by offering tax credits, whereas the first two organisations offer direct support to private and public institutions in Norway. However, unlike Innovation Norway, which has the goal of promoting profitable economic development, RCN mostly supports universities and non-profit research institutes outside the business enterprise sector. This results in RCN constituting relatively small shares of support for small firms.

Fig. 2. Distribution of annual firm-level support for each policy instrument.

Notes: In millions of NOK (horizontal axis) per firm-year. The sum of the shares equals one for each instrument.



Source: Nilsen et al. 2020

While there is a clear support of public R&D investment, the private sector is still underinvesting in R&D. Thus, the issue in this sense is how to find new private funding sources and mobilise funds to be investing in R&D. Public R&D funding needs to be supplemented with private R&D, so they should be understood as complements and not as substitutes (David et al., 2000; Becker, 2015). Increasing private R&D investment requires mobilizing the general public behind SDG goals and targets, rather than blindly following an uncertain market, which is why government involvement in prioritization is essential (Walsh et al., 2020). A market failure can be prevented if there is a probability of detecting if a project is worthwhile (Amit et al., 1998). Partnerships between the public and private sectors are a popular method of organizing an economy or innovation structure. However, they are rarely employed in the context of R&D financing (Hodge & Greve, 2017).

The mobilisation of the general public in local investments is more viable when the investment projects are relevant for local communities, for example, when they result in improved welfare. Such gains to be achieved by the private stakeholders can be easily tracked down to SDGs, at the same time, making such local investments mission-oriented. Such mission-orientation is important for both increased private funding and sustainability of investment projects. First, the general public is more inclined to support investment which directly and positively impacts their local communities. The aspect of positive local change can be supported with the achievement of SDGs on the local level, at the same time increasing the investment sustainability. In other words, private funding contributes to local approval of new investment initiatives, at the same time, initiating the social and cultural changes required for successful realisation and sustainability of local investments.

BACKGROUND

These global changes have had a significant impact on international and domestic strategies for research and development. Often times these also relate to the achievement of UN sustainability development goals (SDGs). In the Norwegian context, the realization of SDGs is addressed in Norway's follow-up of Agenda 2030 and the Sustainable Development Goals. This agenda specifies a transformative roadmap for national action and global partnership with focus on social well-being, equity, and protection of the environment. Moreover, it emphasizes the importance of 'participatory, inclusive and representative decision-making as fundamental for a well-functioning society' (p. 2), which is in line with the UN's vision behind SDGs set on 'not leaving anyone behind'. Therefore, SDGs might be best achieved with a starting point in providing more agency to local communities, which in turn will lead to more sustainable and transformative changes (cf. Bylund et al., 2022).

The same proposition of decentralisation of decision-making and providing more agency to local stakeholders is expressed in the new programme of the Joint Programming Initiative (JPI) developed by DUT Partnership. This program promotes the approach in which all the SDGs are interconnected with specific sub-goals of the SDG 11 – Sustainable Cities and Communities (Fig. 3), and emphasises the importance of local communities in achieving the SDGs. In other words, the realisation of specific SDGs can be successful only when it originates from local communities, which is in line with the assumption that 'transformational change will be local or will simply not be' (p. 9).

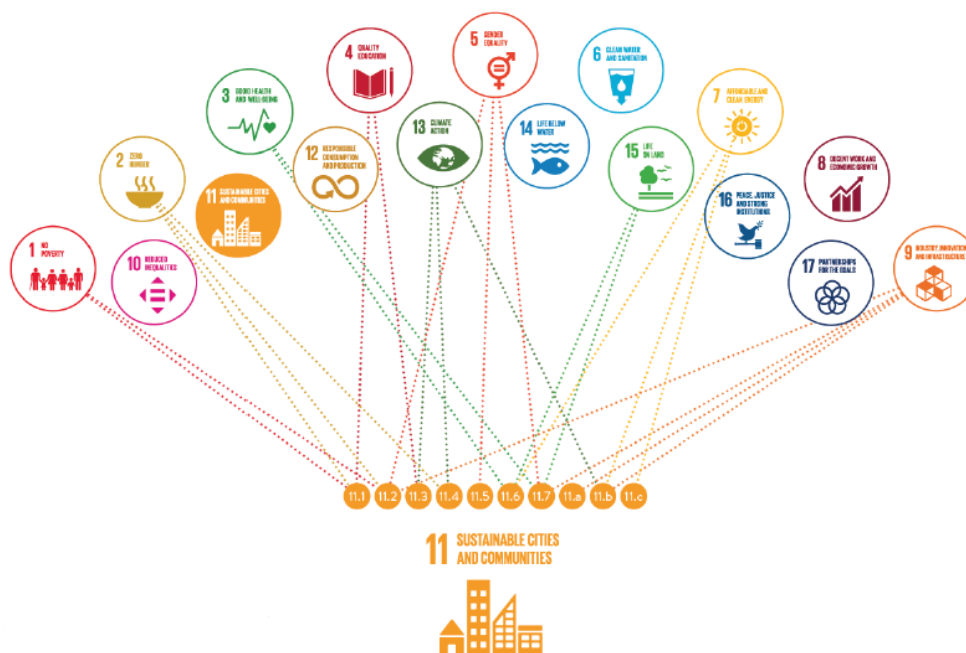


Figure 3 : Relations between SDG 11 and urban-related goals of other SDGs (based on analysis of JPI Urban Europe Scientific Advisory Board)

Clearly, the societal common problems require a collective effort to solve. The existence of innovation support organizations like Nordic Innovation, Innovation Norway, and Investinor, which focus on funds for start-ups and R&D, loans, grants, and venture capital, is not sufficient to bring society back into the innovation process. Mazzucato (2013) argues that building an innovation ecosystem that is capable of addressing complex societal issues requires a bottom-up approach that engages a wide range of stakeholders, including civil society. As a result of the Lund Declaration in 2015, Norway, along with other European countries, has taken on the responsibility of finding solutions to the grand challenges. It is necessary to change both its policy focus as well as its priorities for innovation. It must engage with a wide range of stakeholders in order to address the grand societal challenges and attract the best researchers and innovators from around the world (Kuhlmann & Rip, 2016)

KEY CONSIDERATIONS

- The Norwegian innovation model can be described as a triple helix of evolving networks of collaboration between academia, industry and the government.

Triple helix, or collaboration between universities, businesses and state agencies, is an established frame of thinking about innovation dynamics (Etzkowitz and Leydesdorff, 2000). Current policy developments happen within this framework, focusing on ways to increase innovation through strengthening either of the relationships. Reynolds et al. (2014) found that about 65% of businesses depend on a local production network, access to suppliers, and a skilled workforce. All of these aspects are enhanced by proximity and a favorable innovation environment. Consequently, the assessment of opportunities for increase in R&D investment has largely occurred within the same framework. Yet a significant increase in spending can only be achieved through a systemic shift to new ways of thinking about innovation.

- Civil society can be an important driver of the innovation process and source of capital for R&D funding, yet its role is currently marginal and, consequently, it is neglected in policy making.

When seeking ways to increase R&D funding, we suggest moving to thinking within quadruple helix which adds civil society as an important part of the innovation process (Carayannis and Campbell, 2009).

- Young innovative firms face highest frictions in securing funding and are currently underrepresented in both public and private support.

Early-stage R&D grants have been shown to increase innovative, financial and commercial success of private small and medium sized firms, with some evidence suggesting that small one-time grants may be more effective than larger grants supporting later stages of technology development (Howell, 2017). However, such grants are currently underrepresented in Norwegian public support for R&D. When it comes to private capital, accelerators, business angels, crowd, venture capital financing (including corporate venture capital) and family offices could be alternative sources of such early-stage financing. It is important to note that despite the abundance of venture capital funds, the interests and composition

of investors may limit long-term investments in young companies. Boom-and-bust cycles are another reason why investors don't put enough money into innovative new businesses. Young companies may find it difficult to raise capital for large fixed-cost projects because of this uncertainty, which is beyond their control. (Lerner, 2012; Reynolds et al., 2014). In light of the increasing specialization and specific interests of venture capital firms, early-stage investments of this type tend to focus only on certain stages of a firm's development. In Norway, however, even this type of early-stage firm support is underrepresented.

- Civil society can take part in supporting early-stage ventures by selecting ideas and supporting them with capital.

Crowds can be an integral part of the environment supporting the development of locally-based investment projects. Strong local communities in Norway can be defined with such values as 'fellow citizenship' (Norwegian: medborgerskap) or individual contribution for the good and benefit of the group (Norwegian: dugnad). Norwegian citizens have strong interest and care for their local community, including its social, economic, and environmental dimensions. The proposed solution taps into all these three dimensions, enabling citizens to participate in the innovation process through crowd-funding and selection of projects that are aligned with their individual and local values and needs. This decentralisation of R&D in Norway will also provide individual citizens with an opportunity to invest locally within their financial affordances. Moreover, the solution provides local investors with more affluent resources with a degree of investment security, which comes both in the form of guaranteed maximum loss on investment and in the support for the project in a local community. Therefore, the provision of decision-making agency to individuals at the microlevel of local communities, through their participation in R&D, will result in more sustainable and transformative changes. This might concern R&D activities focused on solving challenges that might be controversial, e.g., energy and environmental issues.

- To bring their technology processes to commercial scale as they move into pilot and demonstration phases, firms need a significant infusion of capital.

Traditional venture capitalists who invest in the early stages of a company are unlikely to invest at later stages of development or in companies that struggle to pass through bust cycles (Reynolds et al., 2014). We need a method of financing that supports firms at different stages of their development. This method will cover the majority of industries, not just those that are preferred by venture capitalists for different reasons. Sometimes governments play the role of funders as well, but they may also act as guarantors and protectors by selecting the priority sectors for venture capital investments.

RECOMMENDATIONS

A government venture capital fund should be established to accelerate the shift to the innovation model in which civil society takes an active role in supporting R&D.

Our general recommendation is to move from supporting R&D and creating policies with the mindset of the triple helix model – academia-industry-government – to a quadruple helix innovation model, to emphasise the role of civil society in supporting R&D and consequently include it in the innovation process. This shift cannot be instantaneous and requires gradual change, including developing new strategic vision for the R&D support in Norway, adjusting regulation to incentivize private actors like philanthropists to engage with research initiatives, building new cultural norms, and so on. At the same time, concrete measures can be implemented to accelerate the emergence of the quadruple helix innovation model in Norway. Our analysis has identified **establishing a government venture capital fund** as the most viable and ready-to-implement idea, which we outline below.

CILIA

This quadruple helix bonding is performed through a crowd funded regional venture fund and CILIA (Crowd Investments of Local Innovation Activities) acting as a state-backed venture capital fund that supports local R&D with private capital.

The fund begins with local investors investing in a regional venture capital (VC) fund. The VC fund is a member of the regional VC fund constellation of CILIA, which is an organization that acts as a constellation of regional venture capital funds. This means that it provides support to multiple VC funds across different regions. VC funds identify startups that are likely to benefit from investment. In order to evaluate the startup's potential for growth and success, they conduct due diligence on them. Startups selected by VC funds have the opportunity to pitch their ideas to a group of investors. These pitches happen twice a year. Crowd investors interested in investing in startups are welcome to participate in the pitches. Additionally, professional advisors assist them in evaluating the potential of the startups. From the idea to the IPO (initial public offering), if the start-up is successful, the funding will continue throughout several phases of the firm's development.

It is the state's policy to double the investment made by crowd investors in order to encourage them to invest in startups. As a result, investors are more likely to invest in early-stage startups due to the reduced risk. In addition to the state doubling the investment made by the crowd, there are also other risk reduction mechanisms in place to protect investors. These may include things like insurance policies or agreements between investors and startups. With the investment from the local investors and the state, the selected early-stage firms receive the financing that allows them to grow and develop their businesses. Startups receive funding that allows them to invest in research and development (R&D) in order to further develop or commercialize their products and services. This private-public R&D spending contributes to innovation and economic growth. Local communities benefit from the growth

and development of successful startups, resulting in increased employment opportunities, economic growth, as well as improved quality of life.

Implementation stages

The implementation of Quadruple Helix (QH) in Norway requires a successful and long-standing Triple Helix (TH) model that can become a key foundation for innovation by involving civil society in the process. Regional governments should take a more nuanced approach when engaging communities than when engaging stakeholders in the context of TH. Gathering their aspirations and needs should be a priority before collecting funds from them. This also means making them aware that they will be spending something to meet their aspirations and influence the future direction of development.

The *first* thing that can be done at an early stage is to identify the vision and themes of the region's regional development and find common ground. This can be done through technology (e.g. online surveys) and face-to-face meetings (discussions and interviews).

This stage requires consultation and dialogue with different groups of people and decision-makers about the future of the region. Test with different groups representing the community and determine the level of participation of decision-makers. This process requires a facilitator who understands the goals of the project. Discussions should also be conducted with an open mind. It can be challenging to keep their attention on something they could be doing better, especially when dealing with senior citizens. Guiding and directing them according to their interests will enhance their contribution significantly. The facilitator's skill in this process is crucial.

The *next step* is developing methods to increase QH stakeholders' participation and cooperation. These methods should focus on mutual trust and respect for local traditions. The role of civil society, in this case, is slightly different from the other triple helix actors, as they have already been involved in the consultations and dialogues conducted in the early stages to describe the vision of local development and how they can be involved in realizing the future vision through their financial participation.

At this stage, the involvement of civil society and the three TH actors is done to equalize the perception that in the future development plan, the financial participation of civil society will be realized with specific projects that meet their aspirations, where at the same time they can participate in monitoring the development projects. In this process, a resource person or facilitator is needed who can encourage and inspire all parties to develop new ideas to achieve the goals. Effective participation of all parties should be emphasized. This can be done in various ways, such as by providing an open-access website, presenting news in blogs or official social media, brochures, creating public events, etc. Any successes or failures in this process should always be publicized for reasons of openness and mutual trust among QH stakeholders.

Two things to remember in the initial process of promoting public funding for innovation are to generate interest in collaboration and to build trust through mutually understood and agreed-upon mechanisms. Although there will be heterogeneity in the QH model, the role of government as a facilitator and advisor is necessary because of its policy-making function. Civil society's needs, interests, and perspectives are at the forefront of initial engagement. Finally, communication, coordination, and specialized media should be created to bridge the interests of different parties for transparency and mutual trust.

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