

NEW EVALUATION FRAMEWORK IN FINNISH INNOVATION POLICY

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1. INTRODUCTION

The aim of this paper is to present ideas for the framework that should be used to evaluate the work carried out by a new Finnish innovation funding and export-promoting organization, Business Finland. The evaluation framework described in this paper includes both impact analysis at the agency level and its implications for decision making at the policy level. It is a challenge to modify traditional impact analysis of R&D and innovation funding into innovation policy actions that may improve the internationalization of the Finnish innovation environment. New terms in this context are export promotion, trial platforms and world-class ecosystems, and traditional terms are radical innovations, productivity and renewing.¹

The structure of the paper is as follows. Section 2 describes the evolution of Finnish innovation policy from a technology-oriented policy to a broad view of innovations and, finally, to an innovation and internationalizing policy mix. Sections 3 and 4 explain the purpose and methodology of the paper. In section 5, we present the potential effects of Tekes impact assessments on the Business Finland model, showing new outcomes of the evaluation framework and evidence of the additionality of public R&D and innovation funding and export promotion. Section 6 concludes the paper.

2. BACKGROUND

Finnish Innovation Policy in 1990-2010

Innovation policy in Finland focuses on improvements in human capital and R&D that accelerate renewal and productivity in the economy. One target, established in the 1980s, was to build a national innovation system. In general, a system is run by public organizations that influence the development and diffusion of technology and innovations. During the 1980s and 90s, industrial R&D spending grew faster in Finland than in other OECD countries. In the 1990s, the policy targeted changes in

technology and was called a technology policy. One target of the policy was material goods product innovations and technological process innovations. At the end of the 2000s, it turned into a broad-based innovation policy (TEM, 2009).

During the recession in the early 1990s, there was an acute need to find new tools, as Finnish industry became uncompetitive in Western markets and unemployment grew rapidly. In the mid-1990s, with recovery already on its way, the chosen policy concept was to adopt intensive technological growth, which became a guideline in the Finnish science and technology policy. Another concept was to combine the national innovation system with a knowledge-based society, which was also called "The Finnish Model" (Lemola, 2003).

At the end of the 2000s, a new innovation policy concept was launched as a broad-based innovation policy. This concept revisited the definition of technological innovations in particular and started to focus on non-technological innovations. The diffusion of technologies and service innovations in particular to society and the economy was considered a main driver of policy actions. The concept also concentrated on the capacity to absorb and utilize innovations produced outside Finland because only one percent of innovations are created in Finland, and small open economies should integrate their innovation actors in research and industry more deeply into global innovation networks (TEM, 2009).

In large-company-led networks, interventions were carried out using the cluster-based approach. The focus was on improving research-led competitiveness in rapidly integrating global markets. The main policy tool was the Strategic Centers for Science, Technology and Innovation (SHOKs) concept launched in 2007. SHOKs were cluster-based public-private partnership organizations. The main idea was to accelerate innovation processes and renew industrial clusters led by large companies from traditional industries. One idea of the SHOKs was to apply new methods of cooperation especially among applied research and industrial companies but also to improve international co-operation and support to develop absorption capacity in Finland (TEM, 2013). To support

¹ Definitions used in the paper:

Platform

A platform is a model in which organizations diagnose problems, identify opportunities and find ways to achieve their goals together. A platform creates value by facilitating exchanges between two or more interdependent groups, usually multiple buyers and sellers. Successful platforms have a tendency to disrupt existing markets and institutions in significant ways.

Ecosystem

An ecosystem is a solution entity supported by interacting actors (public sector, companies, research organizations and individuals), which is self-organized around a focal idea, actor or platform – mainly digital – creating value for its clients and participants in the entity.

Radical innovation

A radical or disruptive innovation is an innovation that has a significant impact on a market and on the economic activity of firms in that market. This concept focuses on the impact of innovations as opposed to their novelty. The innovation could, for example, change the structure of the market, create new markets or render existing products obsolete (OECD, Innovation Policy Platform).

knowledge diffusion, the University Inventions Act came into effect in January 2007. The new legislation along with the introduction of the new University Law (2010) allowed universities to act more freely to acquire external funding and organize their activities. It also transferred IPR rights to universities, as before the act all inventions belonged to the inventors. The reform increased universities' incentives to co-operate with companies and motivated them to take action with regard to the commercialization of research.

CHALLENGES OF INNOVATION POLICY IN 2010S

After the 2008 financial crisis, innovation policy faced new challenges as the Finnish economy was stuck in sluggish growth for 10 years. During the recession, neither fiscal nor monetary policy were able to solve the rigidities of the Finnish export sector. Moreover, the Finnish government made drastic cuts to public research and innovation funding during the period from 2011-2017. The financial cuts decreased co-operation between applied research and companies in particular. Moreover, the government budget cuts in 2015 included the termination of the public SHOK funding, and the SHOKs program was closed in 2016. Another change in the Finnish innovation system was to merge two public organizations, Tekes and Finpro. Tekes – the Finnish Funding Agency for Innovation – had been the most important publicly funded expert organization for financing research, development and innovation in Finland. The goal of Tekes was to boost wide-ranging innovation activities in research communities, industry and service sectors. Business Finland (BF) was created on January 1, 2018, with the aim of combining R&D and innovation funding with internationalization services and invest-in activities.

Since the financial cuts, Finnish innovation policy has focused more vigorously on the concept of innovation environment, which encourages companies to enhance innovations, renewal and international growth. Therefore, Finland should revive value added and enhance economic diversification in the future by improving the internationalization of SMEs. As the OECD (2017) puts it, "Finland needs to tap new sources of growth based on new and sustainable export strengths, as well as by revitalizing traditional industries, fostering their capability to compete globally through new economic competences and value added. This transformation will require Finland to engage more in 'radical innovation' and become more effective in utilizing its valuable knowledge capabilities and transforming them into globally competitive innovation." In the applied research and innovation sector the policy places particular emphasis on the fields of i) wellbeing and healthcare, ii) bioeconomy and clean technologies, and iii) digitalization as new sources of growth.

3. PURPOSE OF THE PAPER

A goal of this paper is to present a new impact analysis framework for the new Finnish innovation and internationalization-promoting organization called Business Finland. A challenge is to build tools to evaluate innovation policy actions to improve export and other global actions as well as productivity in the Finnish innovation sector.

Therefore, the aim is to combine three aspects: first, how to modify the Tekes impact model such that it measures both innovation and internationalization-promoting activities; second, to discuss impact goals

by pointing out the changes in the model by questioning what should be taken into account in carrying out evaluations; third, the evaluation framework should reveal areas where new innovation policy tools make a difference, i.e., considering the increase of inputs and outputs defined as productivity and acceleration of company growth and internationalization. In the current innovation policy set-up, this is supposed to strengthen the economic performance of the business sector and provide the largest benefits to the economy and society in the long term.

4. METHODOLOGY

The aim of R&D&I funding is to generate sustainable economic, social and environmental development and improve the net wellbeing of society. To implement these impacts and outcomes, Tekes has a long tradition of impact assessment. The Tekes impact model includes three main theoretical factors. The first is market failures, i.e., when the private sector (especially startups and SMEs) does not receive sufficient funding to solve puzzles that the market economy cannot solve and moreover does not invest enough in climate change, health care, etc., to achieve societal goals. The second is additionality (inputs, behavioral, outputs, impacts), as expressed for example by Georghiou et al. (2002), namely that if the public sector intervenes it should have an additive impact on the private sector and society as a whole. The third is spillover theory, which highlights that there is a lack of ideas in the market and that the public sector can support R&D and innovations by carrying out co-operative projects that increase the creation of new knowledge and ideas in the economy. The genesis of spillovers indicates that the public sector should also correct system failures, as actors need sufficiently large networks to contribute to the formation of spillovers. When considering export-promoting services we need to add two assumptions, which should be taken into account when evaluating these services in the future. The first assumption is bounded rationality, namely that companies accelerate the costs of gathering and processing information and have no resources to generate it at the company level. Another assumption that is linked to bounded rationality is information failure: SMEs have biased information with regard to their export possibilities in the global market. By considering the costs and benefits of these outcomes, it is beneficial for the economy to produce such information by using public services. The goal of these services is to broaden the growth mentality and understanding of new global challenges in SMEs.

4. ANALYSIS OF EVALUATION FRAMEWORK

The next step is to describe a paradigm change in the evaluation framework. We use the main objectives of Tekes and Business Finland as an example to explain the changes in the framework. These changes can be interpreted as resulting first from the sluggish growth in the export sector and second from the government financial cuts that induced the modifications in the innovation system. If we look at the key areas in the strategies implemented by Tekes in 2005 and 2011, the focus was on cluster-based innovation policy. Industry dynamics, continuous renewal and co-operation, internationalization and impacts on the economy and society were explained through clusters. Clusters were seen as constant-

ly renewing sets of actors looking for new partnerships and value creation at global and multidisciplinary levels. Based on the cluster policy, there were three main objectives for funding.

- The first objective was *productivity and renewal*, whose focus was to examine the impacts of Tekes activities on the productivity of Finnish companies and on the renewal of the business sector. The main findings on the productivity of SMEs were linked to time lags and spillovers. The direct results of innovation activity in companies can be found after a time lag. The results manifest themselves as impacts that promote productivity and renewal and as impacts that spread outside the company (Valtakari et al., 2010).
- The second objective was *wellbeing and environment*, where the aim was to measure Tekes's success in promoting its targets related to societal wellbeing, the environment, and climate change. It was reported that Tekes was able to promote innovations, which had a positive societal impact with regard to this objective. Nevertheless, it was stated that Tekes had little influence on the broader implementation of the outcomes. It is largely beyond the reach of the activities of Tekes to exert a direct impact on societal wellbeing, the environment, and the prevention of climate change (Hjelt et al., 2012).
- The third objective was *capabilities*, and it assessed the role of Tekes in generating innovation capabilities in the Finnish economy. Halme et al. (2015) found that Tekes succeeded well in improving different types of capabilities. On average, the highest impact was on networking, whereas the impact on internationalization activities was weak. However, the differences between impacts on various capabilities should be studied carefully and compared to general targets such as the development of renewing industries.

STRATEGIC OBJECTIVES OF BUSINESS FINLAND

As of 2018, Business Finland has two strategic objectives: 1) Global Growth for Companies and 2) World Class Ecosystems and Competitive Business Environment (Invest-In). Business Finland's strategy is twofold: it enables companies to grow internationally and create world-class business ecosystems and a competitive business environment for Finland. Therefore, its first goal is to create new growth by helping businesses go global and by supporting and funding innovations. Top experts and the latest research data enable companies to seize market opportunities and turn them into success stories. When considering the second strategic goal, ecosystems and business environment, Business Finland's role is to support the creation and renewal of business ecosystems. Moreover, its focus is to strive to have the best competences and talent available. Finally, its goal is to drive co-operation between public and private players and facilitate joint industry actions for selected potential world-class ecosystems.

When considering objectives, one can remark that the innovation process has a long time span. Outputs and business results only manifest themselves a few years after the project has ended. Development of an idea into a product or service and its commercialization may take as long as over ten years, depending on the technology sector. However, the time span can also be short. For example in the ICT sector and especially in the mobile game industry, the innovation process can take only several months, and after this time span the opportunity to enter the market is over.

INPUTS AND ACTIVITIES

In Finnish innovation policy, there are only two funding mechanisms: grants and loans. The third widely used mechanism, tax incentives, is missing in Finland. In recent years, increasing numbers of OECD countries have introduced tax incentives as a primary innovation policy tool. Many international studies show that tax incentives have achieved varying results. The general finding is that the increase in funds invested in companies' innovation activities has been at least equal to the tax incentive. In other words, tax incentives miss the link that would create incentives for companies to increase their own R&D funding more than the amount of the tax incentive. For example, Romer (2000) remarked that designed grants are better tools than tax incentives because government agencies need to identify interventions that are better than what the market would implement; then the targeted grant programs could be socially valuable. The only argument for using tax incentives is that they are easy to use.

The main question is to ensure that public R&D funding adds to the R&D inputs by the companies and does not even partially crowd out these inputs (Georgioui, 2002). Mostly the assumption of crowding out has been refuted by research results. Ali-Yrkkö (2008) and Einiö (2014) found that public R&D funding increases companies' own R&D investments. Moreover, Pajarinen et al. (2016) reported that public R&D funding to startups does not crowd out private venture capital funding. In addition, several international studies show that public R&D funding increases corporate investment in R&D instead of crowding it out. Mostly, input additionality can be explained by a market failure in SMEs.

At the input level, new services have been added to the Business Finland (BF) impact model. The aim of the company growth services is to increase company contacts abroad. When considering ecosystems and invest-in, BF services should recognize potential new ecosystems and attract new players to Finland. Goals have been set to attract both national and international companies to invest in Finland with renewed capabilities to act in value networks. Evaluation of BF services needs new tools because, first, intervention is a continuing process and is more unobserved than funding decisions, and second, there is a need to collect exact data on how services have direct or indirect influence on company behavior.

DIRECT RESULTS AND IMPACTS ON SOCIETY

The ultimate goal for direct results in public R&D and innovation funding is to improve productivity in the private sector. Solid growth in productivity enhances companies' capability to compete in the market and accumulates wealth by increasing the country's ability to fund its welfare services. The rise in productivity is based on intangible investments and innovations. A new product, service or method that produces economic or social benefits defines success in innovation.

When public R&D and innovation funding has a positive impact on the number and quality of R&D projects in companies, the outputs of companies and their business performance ultimately also improve. Several outputs signal improved productivity. In the Tekes impact model, the outputs were measured as growth of new companies and business areas as well as utilization and spillovers of new knowledge. Moreover, outputs can take the form of publications, patents, licenses or new services and processes. The business performance of companies (measured as sales or turnover) is a result of these new products, processes or services, which may improve productivity.

Tekes impact assessments target the productivity of renewing industries and producing spillovers more than export-promotion services. Several research results and impact studies show that Tekes's activities have direct impacts on company innovation efforts and growth. In particular, they have improved the efficiency of innovation activity and have had a positive impact on the creation of innovations and the increase of intangible assets and growth of sales (Valtakari et al., 2010). Business Finland impact assessments focus on accelerating scale economies, trial platforms and ecosystems, and export growth of SMEs in the global market. Radical innovations are forerunners, especially in the internationally oriented SME sector, suggesting that new goals of improved global competitiveness can be fulfilled.

Impact studies that estimate the effects of SME innovation funding and export-promotion interventions have recently been carried out. Halme et al.'s (2018) econometric analysis measured the success of internationally oriented Finnish SMEs in 2009-2015, which were customers of the Business Finland organization (ex-Tekes, ex-Finpro) compared with non-customer SMEs. Overall, there are almost 4,000 internationally oriented SMEs in Finland. The results show that Business Finland customers were younger, more export-intensive and more likely to have workers in innovation-related tasks, on average. Moreover, Finpro or Tekes interventions improved employment growth in Finland, and Finpro customers experienced improved sales growth. Finally, there were also indications of improved export growth.

The international literature indicates varying results regarding the positive relationship between export promotion and internationalization (Halme et al., 2018, pp. 20-23): *"First, there is existing evidence in the literature that more efficient firms become exporters (Clerides, Lach, and Tybout, 1998). Second, there is a common view that firms self-select into export-promotion services; the decision to utilize such services is likely correlated with the unobserved ability to export (Munch and Schaur, 2018)."* Moreover, there is strong evidence in the literature that innovation affects internationalization. For example, Altomonte et al. (2013) found a positive correlation between innovation and internationalization in European countries. They suggest that internationalization goes beyond exports, and internationalization over the longer term is likely to be driven by innovation more than export promotion.

At the societal level, the main indication is how public interventions succeed in stimulating spillovers. The first priority of the interventions is to impact the growth of competence and human capital within actors in the innovation environment. Accumulation of new ideas, knowledge and open innovations determine the success of companies as well as economic growth in the long term. Investment in R&D and innovation are needed to increase competence in the private sector, and the spillovers are needed for society as a whole and the national economy. Several studies indicate that public R&D and innovation funding in Finland has generated spillovers of up to 50-70 % for the whole economy (Takalo et al., 2013; Valovirta et al., 2014). As noted, spillovers to society may accumulate substantially greater benefits than just the impacts on the individual funding recipient. Maliranta et al. (2016) found that *"an increase in innovation subsidies is typically associated with an inflow of innovators from high-productivity firms. These findings suggest that innovation subsidies contribute to economic renewal and the diffusion of knowledge between firms."* In the Business Finland impact model, societal benefits are dependent on ecosystem-level capabilities and furthermore on Finnish companies having a focal

role in global ecosystems. Therefore, societal benefits are dependent on straightforward goals related to SME export growth and the multifaceted role of ecosystems.

Business Finland's impact model based on direct results and impacts on society needs several improvements. One of the challenges for assessing the impact of R&D and innovation funding and export promotion is related to the impact on broad changes in ecosystems of digitalization, cleantech, bioeconomy, health and finally wellbeing at the macroeconomic level. From the evaluator point of view, evaluations need new tools to understand vertical and horizontal interconnections of ecosystems and their relevancy at the level of the whole economy and society. Without these improvements, there is a danger that the final impact results and recommendations will miss the link between ecosystem-level spillovers and the strategic decision-making at the agency and policy level. Therefore, we need more explicit ecosystem-level methods whereby evaluators could focus on Business Finland strategic objectives. Moreover, ecosystems are based on the platform economy, and these platforms need to be sufficiently connected to global demand at the early stage that they can become competitive in the global environment.

5. CONCLUSIONS

The aim of this paper was to demonstrate the revisited evaluation tools that are needed to respond to the demands of internationally oriented innovation policy. These demands are challenging because traditional R&D and innovation-based impact models underline market failures and dynamic aspects of spillovers. Therefore, clear innovation and internationalization logics seem to be ambiguous. One main challenge is to verify the internationalization logic in the innovation-based additionality model. A question is whether we can solve the problem by adding theoretical aspects of bounded rationality and asymmetric information to describe a justification for intervention. Another pathway is to build a link between innovation and internationalization, such that export-promotion services boost growth-seeking innovative companies' access to the global markets. Once this puzzle is solved it will be easier to plan new services for innovation-based platforms and ecosystems.

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