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# PUBLIC SUPPORT FOR ENVIRONMENTAL INNOVATION IN SMEs: THE ROLE OF THE “YOUNG RESEARCHERS FOR THE ECONOMY” PROGRAMME

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**ABSTRACT:** *Environmental innovations are an important factor in the development of a sustainable society. Due to financial constraints, most SMEs do not have a serious interest in environmental questions, even though they represent an important share of pollution and natural resource consumption. In a time of economic recession, different public support mechanisms play an important role in reducing the negative impacts of market failure. The current study focuses on environmental innovation support for SMEs. Specifically, this paper serves as an exploratory study on the effects of public support on the environmental innovation activity, R&D funding and financial performance of SMEs. The authors use a case study approach to collect data and find indications that the “Young researchers for the economy” programme: (1) increases environmental innovations; (2) does not crowd out private funds; and (3) improves the financial performance of SMEs. Drawing on the findings of interviews with general managers and owners, the authors offer recommendations for policy makers aimed at improving the programme.*

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**Key words:** *R&D, environmental innovation, SME, public support, case study*

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**JEL Classification:** L26; Q55; Z18

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## 1 INTRODUCTION

In the long run, innovation is the most important factor that drives any economy. Especially in recession, policy makers should strive for system improvements which assist the business environment in becoming more innovation-friendly. At the same time, innovation is the key factor for the survival, growth and development of small- and medium-sized enterprises (SMEs) (Raymond & St-Pierre, 2010). However, due to financial

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constraints, SMEs conduct less intense research and development (R&D) and other innovation activities (i.e. scientific, technological, organisational, financial and commercial steps which actually, or are intended to, lead to the implementation of innovations) (OECD, 2005) than their larger counterparts (Fritsch & Meschede, 2001; Roper & Hewit-Dundas, 2008).

Environmental sustainability is a typical problem where market failure can have catastrophic consequences. The costs associated with environmental protection, especially the consumption of natural resources and waste disposal, are increasing. Companies are forced to incorporate environmental management into their everyday business to secure a continuous improvement of their environmental performance. Many of them invest funds in environmental innovation in order to comply with regulations, reduce costs and/or improve their competitive advantage.

Public support mechanisms aimed at assisting SMEs with their needs related to innovation are an important element of promoting R&D. Several studies in the management literature relate to public support and innovation in companies. However, this is a complex and extensive topic since national and regional programmes support different types of companies and projects and each agency may be using R&D support with somewhat different policy goals in each industry. Accordingly, R&D support can be expected to have different effects on private innovation activity or on productivity in various industries and for different agencies (Blanes & Busom, 2004). To the best of our knowledge, there has been limited research on the effect of public support on environmental innovations in SMEs. Therefore, our goal is to take a small, relatively exploratory step in presenting the effects of the “Young researchers for the economy” (YRFE) programme, a form of public support aimed at promoting innovation in Slovenian companies, on environmental innovations in SMEs. Specifically, the goal of this paper is to analyse and discuss the impact of the programme on the environmental innovation activity, R&D funding and financial performance of SMEs.

The contribution of the study is twofold. On the theoretical level, this study integrates the current knowledge on environmental innovation and public support for SMEs and discusses the relationship between the YRFE programme as a type of public support, environmental innovations and their source of funding, and financial performance. On the practical level, the study shows the effects of the programme on the examined relationships. The proposed changes might help policy makers further develop programmes for supporting environmental innovation and therefore trigger environmental innovations within SMEs which could have a spillover effect on the economy. In addition, the paper provides examples of projects within the YRFE programme which show SMEs and young researchers how to better utilise their innovative potential. In combination, these contributions will, hopefully, enable a better understanding of the topic.

The paper proceeds as follows: after a brief review of the literature on environmental innovations and public support, we introduce the research questions. We then explain the methodology used to obtain the information and introduce the selected cases. Thereaf-

ter, we present the results of our analysis. We conclude by summarising and discussing the results, presenting the limitations of the study, and providing directions for future research.

## 2 THEORETICAL CONTEXT AND RESEARCH QUESTIONS

The management literature has been widely discussing environmental issues and proposing how companies should manage their operations in a sustainable way. One of the research streams focuses on environmental innovation.

### 2.1 Environmental innovation in SMEs

Environmental or eco-innovation “is any form of innovation resulting in or aiming at significant and demonstrable progress towards the goal of sustainable development, through reducing impacts on the environment, enhancing resilience to environmental pressures, or achieving a more efficient and responsible use of natural resources” (European Commission, 2011, p.2).

Environmental innovations can be classified into technological and organisational environmental innovations. Technological environmental innovations relate to product and process innovations (e.g. sustainable resource management, cleaner technologies, benign substitution of hazardous substances, bionics and biomimicry, design for the environment), whereas organisational environmental innovations refer to the implementation of new management techniques such as the Environmental Management System (EMS), introduction of significantly changed organisational structures, or the implementation of new corporate strategic orientations (Huber, 2008; OECD, 1997). Rennings (2000) showed that environmental innovation has double externality characteristics, meaning that beside the positive externalities from the spillovers that are common to all innovations, environmental innovations also reduce external environmental costs as a negative externality. Environmental innovations may be developed with or without the intention of reducing a negative environmental impact, such as lowering costs or enhancing product quality (Beise & Rennings, 2003).

Yalabik and Fairchild (2011) developed an economic analysis in order to examine the effects of consumer, regulatory and competitive pressure on investment in environmental innovation. They found that regulatory pressure has the intended effect as long as the company's initial level of emissions is below a certain threshold. If the emissions are above this threshold, then subsidies that free up a company's resources seem to be more effective than consumer pressure or environmental fines. They also suggested that competition can be an effective driver of environmental innovation, especially if consumers are likely to switch due to environmental performance. Noci and Verganti (1999) identified similar drivers of environmental innovation specifically for SMEs. Based on case studies, they found two drivers influencing environmental innovation: (1) product and

process environmental regulation; and (2) social awareness and concern for the environment. They argued that the drivers are interrelated (regulation is a result of society's stronger demand to preserve the environment, whilst the social demand for greater eco-efficiency is induced by regulation). Regulation and social concern may lead to innovation because of the competitive opportunities and threats they induce.

Introducing the environmental dimension into a company's operations is a complex task. The barriers that hinder the development of environmental innovation may differ for specific sectors, company characteristics and types of environmental innovation (e.g. incremental or radical innovation; process or product innovation). The research carried out on environmental management in SMEs identifies limited financial resources, poor environmental training and a short-term orientation, a lower capacity to innovate and a lack of relation ability with external stakeholders (del Brío & Junquera, 2003) as some of the most important barriers to innovation activity. In addition to the listed disadvantages, regulation is another factor with a considerable effect on SMEs' innovation compared to large companies. SMEs are thus forced to cope with political, technological, administrative and legal challenges that make their operations more complex (Dean & Brown, 1995).

## **2.2 Public support for innovation: The “Young researchers for the economy” programme**

There are over 20 million enterprises in the European Union (EU), the vast majority (99.8%) of which are SMEs (EIM Business & Policy Research, 2010). Most SMEs do not have a serious interest in environmental questions, even though they make up an important share of pollution and natural resource consumption. It has been estimated that SMEs' share of the contribution to pollution levels is around 70% (Hillary, 2000). There are many reasons that SMEs should incorporate the environmental dimension in their everyday operations: increasing demands in legislation and international standards, the increasing pressure of stakeholders (customers, NGOs, suppliers, financial institutions etc.), the potential for cost savings, market opportunities, increased reputation and trust etc. Studies which examined both internal and external factors that prompt environmental innovations in companies (Green et al., 1994; OECD, 2000) show that regulations and market-related drivers, such as competition and increased market share, are the most important drivers. In SMEs, market factors that propel environmental innovation are usually not strong enough due to their special characteristics such as a lack of financial and managerial resources, and a low capacity to form relationships with different stakeholders (Hansen, Søndergård & Meredith, 2002). A number of different support instruments aim to assist SMEs by removing potential barriers and reinforcing innovation activities.

The use of knowledge in innovation is a key factor in adding value to products and services and a condition for a competitive economy. The ideas for innovation come from a variety of internal and external sources: employees, customers, suppliers, researchers

etc. This means that a company must establish a link between the production or R&D department and external sources in order to produce innovations. SMEs can rarely afford their own R&D facilities and for their workforce to be specialised so government's role is to increase the ability of SMEs to generate such ideas and develop successful innovations.

Between 2007 and 2011, the YRFE programme, partly financed by the European Social Fund, was carried out by the Public Agency for Technological Development of the Republic of Slovenia (TIA), an independent public agency responsible for enhancing technological development and innovation. Today the programme is being carried out by the Slovenian Research Agency (ARRS). The programme aims to foster cooperation between R&D institutions and universities with industry (TIA, 2011). It stimulates companies to hire young graduates to enhance their innovation activities. Young researchers are trained while working on actual research projects conducted by a company. The programme is carried out within the Operational Programme for Human Resources Development for the Period 2007–2013 (OP HRD) that represents a joint programming document of Slovenia and the EU. In terms of environmental objectives, the OP HRD promotes the integration of environmental aspects in the pursuit of other objectives. Within the framework of entrepreneurship, particular attention is given to job creation that makes use of environmental potentials (eco-innovations, the third sector in the field of promotion and preservation of natural assets etc.) (Government of the Republic of Slovenia, 2007). In order to achieve these objectives, the YRFE programme, where the environmental dimension is one of the evaluation criteria for support, has been carried out.

### 2.3 Research questions

SMEs face a number of problems constraining their innovation activities. Among others, special attention should be paid to finding funding and negative environmental impacts. Given the lack of research findings in the current literature, this paper is concerned with the three research questions presented in the following paragraphs.

*(1) Does the YRFE programme increase environmental innovations in SMEs?*

The YRFE programme can be classified as R&D support which has been found to be three times more effective than taxes in promoting investment in energy-efficient technologies (Azar & Dowlatabdi, 1999). A positive correlation between public R&D funding and private R&D effort has been confirmed in numerous studies (e.g. Levy & Terleckyj, 1983; Robson, 1993; Nadiri, 1993; Irwin & Klenow, 1996; Lerner, 1999). For example, Carboni (2011) found that public support encourages the use of other internal sources which leads to more innovations. When evaluating the effect of public support on environmental innovation activity, the nature of a particular support has to be considered. The YRFE programme requires SMEs and young researchers to formulate a programme of collaboration in the application for the support, and the criteria in the application

assessment, to make sure there is a contribution to the sustainable development of the environment. This is a motive for SMEs to consider the environment as a factor in their innovation activities. Moreover, SMEs are obliged to report their progress on a yearly basis. Therefore, we believe we have found an indication that the YRFE programme has contributed to the sustainable development of the analysed companies through environmental innovations.

*(2) Does public support for the YRFE programme crowd out private funds for innovation in the field of environmental science?*

Attention in the literature (e.g. Buson, 2000; Czarnitzki & Fier, 2001; Lach, 2000) has also been given to the dilemma about a complementary or substitutive relationship between public and private R&D funding. A complementary relationship legitimises public funding, whereas a substitutive relationship is almost regarded as a misallocation. Public funding reduces private investors' costs regarding their innovations and a company therefore has an incentive to apply for public R&D support even if the expected private return is positive and it could perform the innovation activity projects using its own financial means (Czarnitzki & Hussinger, 2004). This alternative eases possible liquidity constraints because it is cheaper than raising funds in the capital market. Thus, a company might simply substitute public for private investment. One possible explanation of the "crowding-out effect" is that government bureaucrats are under pressure to avoid the appearance of wasting public funds. Therefore, they may tend to fund projects with higher success probabilities and clearly identifiable results, i.e. projects with private rates of return (Lach, 2000). Buson (2000) found that in about 30% of Spanish companies public funding crowded out privately financed innovation activities. In contrast, Czarnitzki and Fier (2001) conclude that public funding is complementary to private investment in innovation activity. The YRFE programme lowers innovation costs and provides companies with young, inexperienced yet highly knowledgeable people who in many cases are overqualified relative to their experience and thus not employable. High wages for environmental R&D personnel are an important reason why SMEs do not consider employing highly-educated young professional with limited experiences, especially when environmental innovations are not related to their core business. Accordingly, we expect to find no crowding-out effect in the analysed cases.

*(3) Does the YRFE programme improve the financial performance of SMEs that are environmentally innovative?*

Public support is always a sensitive political question, which has caused the measurement of the impact of the support in numerous studies. Although some results have shown that subsidies by themselves do not necessary increase financial performance without additional incentives for collaboration (Czarnitzki et al., 2007), the majority of studies have shown that public funding is an important source of finance for R&D in SMEs. There is an indication that recipients would perform fewer innovation activities without support, and that those companies that do not get the support would perform significantly better if they were publicly funded (Czarnitzki et al., 2007). The literature

shows that support awarded on a competitive basis (as in the case of the YRFE programme) leads to increased environmental innovation activities, while support assigned through an automatic procedure does not (Colombo et al., 2011). Based on the literature, we expect to find an indication that increased environmental innovation activity resulted in environmental innovations that have improved the financial performance of SMEs. Environmental innovations usually encourage more efficient use of raw materials, which results in lower costs for materials and waste disposal (Young, 1991). It was confirmed that greater resource productivity, process change, and product innovations constitute a platform for competitive advantage (Cairncross, 1992; Faucheux, Nicolai, 1998; Lampe et al., 1991; Porter & van der Linde, 1995). Moreover, in some cases, companies are able to convert waste into saleable products (Porter & van der Linde, 1996) and cut emissions below the required levels, reducing the company's compliance and liability costs (Hart, 1995). Finally, environmental innovations can help companies improve their reputation, which is in itself a source of market advantage (Eidat et al., 2008).

### 3 EVIDENCE FROM BUSINESS PRACTICE

#### 3.1 Research methodology

The empirical part of this paper is derived from the YRFE programme whose aim is to support Slovenian companies along their innovation path and to increase the employability of young researchers. In particular, we dealt with environmental innovation in Slovenian SMEs.

A case study approach is employed as the research strategy. A case study is designed for research questions which require a detailed understanding of social or organisational processes because of the rich data collected in the studied context (Cassell & Symon, 2004). As the purpose of this study is to explain and describe the effectiveness of the YRFE programme in promoting environmental innovation in SMEs and improving their competitive position in the market (which is an understudied topic, still in the exploratory stages), case studies seem to be the most suitable approach.

The empirical part consisted of two steps. The first step was to select the cases from the database administered by the TIA. With the help of the TIA, we were able to identify and contact nine SMEs that are significantly incorporating environmental issues into their R&D. Finally, three of them, each from a different industry, were selected for the research. The case studies, albeit small in number, shed light on the investigated phenomena and give interesting insights into environmental innovation in SMEs. These companies are diverse in terms of the products they sell, the kind of customers and the market they serve as well as in terms of their strategic orientation and technological advancement, which enabled us to design a broad picture of the effects of specific public support on environmental innovation in SMEs. The second step was to investigate the research topic, where we followed the theoretical propositions. To limit bias when collecting the data, numerous and highly knowledgeable informants (general managers and owners) were



interviewed with the use of semi-structured interviews. The evidence collected is based on various sources (e.g. interviews, annual reports, internal documents, web pages etc.).

In each company, we investigated the environmental behaviour, current and planned environmental innovations, implementation and effectiveness of the YRFE programme and its contribution to financial performance. The three studies are described in the following section.

### 3.2 Case studies

**Company A** is a small private research institute, a member of various international technology platforms, focused on research in microbiology, molecular biology and biophysics with a revenue of EUR 472,000 in 2010, which was 276% more than in 2007 when it entered the YRFE programme. It employs a multi-disciplinary team of scientists with diverse backgrounds ranging from biology, microbiology, biochemistry and biophysics to electrical engineering. The company focuses on calls for tenders of the Republic of Slovenia and European Union institutions. It does not rely on the imitation of foreign practices so it reinvests all of its surplus revenues in innovation activities.

Company A pursues an environment-oriented strategy where the environment is seen as a key factor and is integrated into the corporate strategy. It is an example of an organisation which looks for growth opportunities in the most pressing environmental issues. Employees have developed a broad range of molecular biology competencies that support their scientific research in the segment of ecology. It is a profit-oriented organisation so it tries to find innovations which would have the greatest financial leverage. For example, in the last three years the company has largely invested in the drinking water industry. Water supply has become a leading issue due to the increase in the population, the accumulation of wastes in big cities, and the agricultural industry and its impact on groundwater in rural areas. Recently, the company achieved success with two environmental innovations. The first is a temperature gradient capillary electrophoresis which helps in studying the structure of DNA. This is useful in the process of describing and comparing functional dynamics of microbial communities in the environment and in the human body (how long it takes for microbial communities to develop, which conditions are necessary and how can the life cycle of those communities be stopped with minimal invasion in the human body). Besides curing infections, researchers also analyse the role of mycobacteria in environmental and human microbial communities and interactions with other microbes that impact their virulence and antibiotic resistance.

Company A's management has been exploiting the opportunities offered by the YRFE programme since 2007. Young researchers work on analysing water collection facilities and improving the water supply system. The results of such studies represent a platform for specific actions for companies to improve the quality of water consumed by households. The company considers this type of support is very important because without it the company would have difficulties financing the employment of all the researchers. The

YRFE programme thus allows the company to make larger investments in technology for microbiological research.

**Company B** is a private company that operates in the field of education and the introduction of quality standards since 1990. In 2010, it generated EUR 315,000 in revenues, 45% more than in 2007 when it entered the YRFE programme. The company experienced high revenue growth between 2007 and 2010, while its revenues in 2011 only grew marginally. Due to its small size, individual positions in the company's organisational structure do not have strictly defined job tasks so all employees are responsible for finding new market opportunities.

Environmental protection has not represented an important part of the company's business mission and is actually of secondary importance. Thus, the company pursues a market-oriented environmental strategy where individual environmental actions derive from specific market and competitive forces. In the second half of the last decade, company B perceived a lack of expertise in the field of environmental protection. Although the environment had been subordinate to the business strategy, management decided to broaden the product assortment in the field of education on environmental protection. Company B now offers, beside other things, consulting in the field of waste management, assistance in the preparation of a waste management plan and the handling of specific types of waste (asbestos and similar), along with management of a packaging and waste packaging plan.

Due to the expansion of the product assortment, in 2008 company B applied to the YRFE programme. A young researcher has since specialised in the area of environmental protection required by Slovenian and EU regulations. His research work upgraded the energy consumption measurement methods which allow the protection of production facilities and reduce resource consumption. The new measurement techniques enable companies to reduce environmental pollution caused by emissions from overheating. Company B reported the programme's positive effect on cost reductions and, moreover, granted start-up capital for a new segment of innovative educational activities. Based on the market trends and tougher environmental regulations, the company will continue to develop this segment.

**Company C** is a private company that operates in the field of environmental consultancy for construction and landfill projects. It had EUR 1,298,000 in revenues in 2010, which is 58% more than in 2007. Besides consulting, the company produces reports on environmental impact analysis, the risk of water contamination, safety construction analysis etc. Particularly important are its activities involved in reducing noise, advising on obtaining environmental approvals, and the production of biological, industrial and other wastewater treatment plants.

When it comes to environmental behaviour, the company pursues a market-oriented environmental strategy, meaning that its environmental actions reflect market demands. It designs a variety of insulation systems for its clients, enables them to switch to fuels with

a smaller adverse environmental impact, and helps them reduce air pollution and meet noise reduction requirements. Company C does not have a very innovative history. The only environmentally innovative project has been a research study by a young researcher concerned with the analysis of the molecular construction of biogas and a comparative analysis of its production methods, which enables the construction of a more energy-efficient plant for biogas. This resulted in the immediate acquisition of a new customer, and consequently anticipated future revenue growth.

Due to a lack of extra funds in recent years, the management had difficulties earmarking part of the company's funds solely for research in environmental protection. The YRFE programme has reduced the costs and enabled this R&D activity. Company C expects a further increase in revenues with the help of the research findings. As a result, management is considering the long-term employment of the researcher to develop a new niche in the field of environmental protection.

### 3.3 Research findings

The results of the three case studies described in this paper are summarised in Table 1.

Table 1: *Summary of the case study results*

Company	A		B		C	
Participation in YRFE	Before	After	Before	After	Before	After
Revenue growth 2007-2010	276%		45%		58%	
Innovation activity	High	Even higher	Not existed	Low	Low	Medium
Degree of environmental innovativeness	Medium	High	Low	Medium	Low	Medium
Degree of private investment in innovation	High	Even higher	Low	Low	Low	Medium-low
Crowding-out effect	Not present		Not present		Not present	
Environmental strategy	Environment-oriented		Market-oriented		Market-oriented	
Influence of YRFE on environmental innovation	Strong		Strong		Strong	

Mostly based on the perception of the general management, the case studies suggest there is a positive effect of the YRFE programme on innovation activity in SMEs. All three SMEs reported increased investments in environmental innovation activities after they entered the YRFE programme, which indicates its success. Moreover, the young researchers in all three companies have been perceived as the key factor of environmental innovation. All three companies reported a significant impact on R&D, in fact participation in the YRFE programme even initiated environmental innovation activities in companies B and C. The case study findings therefore enable us to develop:

*Proposition 1: The YRFE programme increases environmental innovation in participating SMEs.*

The results of the case studies also suggest that the YRFE subsidy does not crowd out private funds from investments in environmental innovation. In management's opin-

ion, the support instead stimulated investments in environmental innovation due to the ambition to harvest the young researchers' potential. The statement is further supported by the argument that even when management had the intention to employ a young researcher before receiving the support it still invested the intended amount of private funds in environmental innovation after joining the YRFE programme. This means that all three companies have not decreased their private investments in innovation activities after they entered the YRFE programme. The stagnation of private funding for R&D was only reported in company B. Although company A obtained the highest support among all three companies, it also invested the biggest share of income in environmental innovation and reported by far the greatest number of innovations. Thus, we propose:

*Proposition 2: Public support for the YRFE programme does not crowd out private funds for innovation in the field of environmental science.*

Participation in the YRFE programme has not significantly influenced the core businesses of the examined companies, but it has helped with the discovery of new market opportunities. Indicatively, besides an increase in innovations, all three companies achieved significant revenue growth in 2010 compared to the year before they joined YRFE. Company A managed to demonstrate by far the best performance regarding income growth (276%). It could be wrong to simplify the reasons for this fact. However, it is evident that company A has shown better results than the other two companies in all examined parameters. It has invested more private funds and involved more employees in environmental innovations. It has also achieved a higher degree of innovativeness, which would be difficult without the participation in the YRFE programme considering the fact that more than half of its employees are, or used to be, young researchers from the YRFE programme. Interestingly, company A is also the only one which is pursuing an environment-oriented strategy. While the other two companies are waiting for a "market signal", the management of company A is trying to discover new opportunities and anticipate the needs of consumers, before they appear. The results of the case studies therefore suggest:

*Proposition 3: The YRFE programme contributes to the improved financial performance of SMEs that are environmentally innovative.*

#### 4 DISCUSSION, IMPLICATIONS AND LIMITATIONS OF THE RESEARCH

The purpose of the paper is to examine and discuss the relationship between the YRFE programme, a form of public support aimed at promoting innovation in Slovenian companies, environmental innovations and their source of funding, and the financial performance of SMEs. In addition, the paper provides examples of environmental projects underway in the YRFE programme.

In **summary**, the research findings indicate that the YRFE programme has several positive effects. The case studies suggest that the YRFE programme encourages environ-

mental innovation in SMEs. Further, this particular public support does not crowd out private funds from investments in environmental innovation; instead, it stimulates private investments. This, in turn, brings positive effects for each company's financial performance.

The ability to envision, design and implement an R&D project depends strongly on the formal and informal skills of the employees and managers (Blanes, 2004). Establishing an R&D programme involves significant sunk costs, and large fluctuations in the level of spending on existing research activities are very costly because a great portion of R&D spending is represented by wages (Czarnitzki, 2006). As these are usually high-skilled workers, significant hiring, firing and training costs are incurred. The YRFE programme lowers the costs associated with hiring and training and contributes to the employment of young professionals. In this respect, the YRFE programme stimulates interaction between SMEs and knowledge providers from universities. While researching and working on specific projects, young researchers develop 'tacit knowledge' which is difficult to imitate and complex to learn. Therefore, they become very valuable for the company. Their specific knowledge, skills, competencies and experiences obtained at universities and developed through their research improve not only the competitive position of the company they work for but also increase their value and employability.

Based on the findings, several **implications** for policy makers can be pointed out. Although the case studies indicate that this kind of support is beneficial for companies, young professionals and the national economy in a sense that interaction with science stimulates more advanced innovations, many SMEs are still unfamiliar with programmes like YRFE. Usually, the incentive to apply comes from a candidate who informs a company about the possibility of gaining financial support. Improved two-way communication between public organisations and SMEs is very important. In order to be effective in this public support, the first thing is to raise awareness of it through consulting, workshops and similar activities, nationally and also internationally to attract foreign researchers and to capitalise on knowledge from abroad. Apart from the current practice, some public support could be specifically directed to start-ups run by highly educated people with knowledge and capabilities to be environmentally innovative, or to support academic spin-offs and thus utilise academic research in a commercial manner. In order to be effective, public support should only be given to the most promising projects and talented professionals that lack funds. Accordingly, the inefficient distribution of the public funding would be limited and the crowding-out effect reduced. To achieve the positive effects, the integration of financial indicators that show the past financial performance in the support application is necessary. Further, the authors also noticed a lack of feedback information about the young researchers' progress. Since it is not uncommon for a company to start exploiting a young researcher for everyday business, special attention should be paid to regular progress reports to ensure they are working on the research project.

In our opinion, such public support should be more focused on environmental research because environmental issues are becoming ever more important and environmental

innovations hold great potential for companies and national economies. In this respect, additional questions regarding environmental R&D and the commercial usage of the innovations should be included in the application. Lastly, companies should be given only a few years of the exclusive right to transfer the know-how into innovations. After that period, the know-how should become a public good.

This study has certain **limitations** and drawbacks which have to be taken into account. We are aware that the sample is too small and composed of non-randomly selected companies that agreed to participate in the research. Thus, there could be a sample bias in the sense that the companies differ from the general population with regard to their aims and results of implementing the YRFE programme. The proposed relationships might also vary from one industry to another and future research should therefore continue to examine the effects of the support on environmental innovations in a range of industries and at different levels of the supply chain. Accordingly, it could be beneficial to include a sample that covers a broad variety of SME characteristics to gain a better understanding of possible behaviours of SMEs. Another limitation is the nature of the case study approach, which limits the generalizability of the findings. Therefore, future research should employ a quantitative study to test the propositions and thus allow the findings to be generalised. In addition, only one specific type of public support was considered in this paper. To overcome this limitation, future studies should compare the effectiveness of different public support mechanisms on environmental innovation. Moreover, it may also be the case that this present time, characterised by unfavourable market conditions, biases the findings. In summary, there are numerous opportunities for extending our study with the help of literature from other scientific disciplines to fill the gaps in our knowledge, particularly about the effects of different public mechanisms on environmental innovations within SMEs. Despite all these caveats, we hope the paper stimulates further research in the field of public policy and environmental management.

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