Subsidies, Enterprise Innovativeness and Sustainable Growth

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Abstract. This paper investigates associations between the subsidies, innovativeness, sustainable enterprise efficiency and growth. The focus of the study is on the subsidies for co-financing of purchases of new technological equipment with aim to increase enterprise innovativeness and production of new products. The analysis focuses only on the subsidies for co-financing of purchase of new technological equipment. This in-depth analysis of the three data sources from enterprise accounts, subsidies for technological equipment, and surveys in enterprises represent an important data management tool to evaluate achievement effects of subsidies as an important research, managerial and policy question. Subsidies can mislead enterprises that instead of improving efficiency they redirect attention to capture subsidies. The paper employs a combination of enterprise accountancy data, data on subsidies and unique in-depth enterprise level survey data. The analysis is conducted for the enterprises, which have received subsidies for innovation activities. The focus of the analysis is on the following four economic-financial indicators: total revenues, number of employees, profits and value-added per employee. The principal component analysis and multiple regression analysis are used to test the hypotheses related to the four economic-financial indicators and their comparisons. The principal component analysis revealed four components: supports for innovativeness, procedures and standards for innovation, innovation as condition, and the ways of innovation. The multiple regression analysis confirmed the positive association between innovativeness and enterprise efficiency.

Keywords: subsidies, enterprise innovativeness, economic-financial efficiency of enterprises, sustainable growth, Slovenia.

1 Introduction

In the European Union (EU) countries, European Commission allocates direct financial contributions in the form of grants to projects or organizations that promote European interests or participate in the implementation of EU programs and policies (European Commission, 2010). The European Commission confirmed National Strategic Reference Framework (NSRF) to each EU Member States. The NSRF includes priorities, indicative annual budgetary allocations, and list of operational programs. The general orientation of the NSRF is to improve the well-being of the population by promoting economic growth, creating jobs and strengthening human capital and ensuring a balanced and harmonious development, particularly between regions. On one hand, this orientation defines prosperity as a global goal, and on the other hand, it places particular emphasis on promoting economic growth and job creation, which are the key objectives of the Lisbon Strategy, as well as balanced regional development. Small and medium-sized enterprises (SMEs) are eligible for assistance in the form of grants, guarantees and loans.

The countries that are developing dynamically towards the knowledge society are characterized by intensive investment in research and development (R&D), have developed close connection between public research and education sectors and the economy, experience high degree of innovation, are
abounded with highly skilled labour force, and have developed good information infrastructure with support of good quality of institutions (OP KRRP, 2008).

The paper aims to investigate associations between the grants for co-financing, innovativeness and enterprise efficiency using a combination of enterprise accountancy data, public grants data, and unique in-depth enterprise level survey data. Slovenia is selected as a case study among the EU Member States, because it is one of the new EU Member States with relatively developed data management infrastructure, which is necessary for such an analysis. The focus of the empirical research is on grants from public tender P4 for co-financing of purchases of new technological equipment. These grants aim to increase enterprise innovativeness and production of new products. The research problem is relevant for theory, management of data systems and society on how these enterprises perform and how public subsidies are used.

The rest of the paper is structured from the following additional six sections. The second section explains background and literature review. The third section explains stylized facts using empirical data. The fourth section explains methods and data. The fifth section tested the hypotheses on the impacts of grants from public tender P4 and innovativeness, respectively, on the performance of the enterprises. The sixth section presents findings and implications. The final section derives conclusions.

2 Background and hypotheses

2.1 Grants as Supportive Environment for Entrepreneurship

Structural Funds intend to facilitate structural adjustment of specific sectors, regions, or combinations of both, in the EU Member States. Structural Funds for regional research, technological development and innovation (RTDI) are focusing on sectors involving R&D, technological innovation, entrepreneurship, innovative information and communication technology (ICT) and human capital. They cover the European Regional Development Fund (ERDF), the European Social Fund (ESF), the Guidance Section of European Agricultural Guidance and Guarantee Fund (EAGGF) and the Financial Instrument for Fisheries Guidance (FIFG). ERDF constitutes a financial instrument of the European cohesion policy, which aims to strengthen economic and social cohesion and helps to redress the main development imbalances in the EU Member States regions.

In the background paper on the promotion of entrepreneurship and competitiveness (updated program of measures to encourage entrepreneurship for the 2007-2013 period), a program of measures is based on four connected basic pillars (Government of the Republic of Slovenia, 2007):
1. Promoting entrepreneurship and entrepreneurship-friendly environment;
2. Knowledge for the economy;
3. Development and innovation in the economy;
4. Promotion of SMEs through equity and debt financing.

The first pillar measures are aimed at promoting entrepreneurship and entrepreneurship education with a view to improve the entrepreneurial culture in Slovenia and to increase awareness and use of public support services for potential entrepreneurs and established enterprises. An important component of measures is development of effective, transparent and supportive enabling environment. The second pillar measures are devoted to strengthening the internal capacity of enterprises for more intensive, knowledge-based development, especially in the field of technology in order to enable the Slovenian economy, especially SMEs, to cope with rapid technological progress, which is the main element in increasing competitiveness in the global economy. The third pillar measures are focused on increased
investments in R&D and economic infrastructure of the private and public sectors. Measures to support the development and innovation in the economy are aimed at establishing an effective support environment, the creation of adequate infrastructure at the local and the national level, and strengthening the financial resources for R&D and innovation in the Slovenian economy. The fourth pillar measures are aimed at financial support to SMEs through equity and debt financing. Venture capital is provided through venture capital funds as a form of equity financing in the context of public-private partnerships.

2.2 Public Tender P4

One of the most interesting public tenders was P4. The subject of the public tender P4 was co-financing (direct subsidies) of the purchase of new technological equipment which represents the initial investment. Initial investments are investments in tangible and intangible assets related to the establishment of a new business, expansion of an existing business, expanding the enterprise's activities into new additional products or a fundamental change in the overall production process of an existing enterprise. The purpose of the public tender P4 is to promote the initial investment, which will be reflected in the greater competitiveness of enterprises as measured by increased growth and productivity, and greater competitiveness on the market and higher value-added per employee.

The purpose of the public tender P4 and the criteria for achieving the objectives were oriented in the direction of increasing innovation and value-added per employee. This means that through the grants the organizer of the public tender P4 wanted to increase the level of innovation and the value-added per employee, including a higher value of financial indicators in enterprises.

2.3 Innovation

Innovation is one of key stones in EU strategic documents that are the basis for drawing up public tenders. Receiving grants for the enterprises and other organisations from the EU is in public tenders related to innovation and reaching objectives by integrating innovation. Organisations were requested to provide: a new product developed by the development team within the organization; a new product developed with external research institutions; a new patent; a new internal innovation; new technological processes; and similar. Schumpeter (1961) claims that innovations represent a strategic stimulus and the basis for economic development. He further argues that innovations (despite the usual huge obstacles in the initial phase) are the base for cyclical fluctuations in economic growth, because after the introduction of innovation, economies exhibit growth, which is later on followed by recessions of different lengths and amplitudes. Drucker (1985) says that innovation is the specific tool of entrepreneurs, the means by which they exploit change as an opportunity for a different business or service. It is capable of being presented as a discipline, capable of being learned, and capable of being practised. Innovation does not necessarily imply the commercialization of only a major advance in the technological state of the art (a radical innovation) but it includes also the utilization of even small-scale changes in technological know-how (Rothwell et al., 1985). Bessant et al. (2007) claim that innovation is an imperative for business survival, because innovation contributes to competitive success in many different ways – it is a strategic resource to getting the organization where it is trying to go, whether it is delivering shareholder value for private sector firms, or providing better public services, or enabling the start-up and growth of new enterprises. Chesborough (2003) claims that the idea of open innovation is that even large-scale R&D in a closed system like an individual form cannot be enough in the twenty-first-century environment. - If there are relatively limited R&D expenditures and their inefficient use, we cannot expect to increase innovation and new patents that would place countries and enterprises ahead of the competition within the EU and in global trade (Bojnce and Fertő, 2011, 2014). In this way, the country can deteriorate its international competitiveness.
2.4 Economic Environment, Innovation and Sustainable Growth

Bessant (2003) argues that there are a number of stages in progressing in terms of the development of systems and capability to involve people but also progressing in terms of the bottom-line benefits which can be expected. Each of these takes time to move through to find ways of overcoming the particular obstacles associated with different stages, and there is no guarantee that organizations will progress to the next level. Isaksen (2006) claims that a number of models of the creative process can be helpful to those who need to engage in innovation and entrepreneurship. One proven and practical process for challenging the way to perceive things includes three main states: understanding the opportunity, generating ideas, and planning for action.

As Christensen (1997) showed on disruptive innovation, when new markets emerge they do so at the fringe of existing ones and are often easy to ignore and dismiss as not being relevant. So working on getting even closer to existing customers actually takes it further away from what becomes the site of the real action.

In general, empirical research suggests that firm performance is positively related to innovation, although in some studies direct effects have not been found (Mavondo et al., 2005). Rogers (1995) argues that the success of the innovation also depends on, how well it adapts to the needs of increasingly demanding and risk adverse behaviour of population. Minguela-Rata et al. (2014) indicates that Spanish manufacturing firms that cooperate technologically with suppliers have a greater propensity for product innovation and, specifying, for radical innovations; and the larger firm size, greater the propensity to product innovations. However, radical product innovations depend on some characteristics of firms and environment. A number of studies confirm that family background affects an individual’s propensity to establish a new venture. A significant majority of technical entrepreneurs have self-employed or professional parents. For example, one seminal study found that four times as many technical entrepreneurs have a parent who is a professional, compared with other groups of scientists and engineers (Roberts, 1991).

Tidd et al. (2006) for sample of service firms in the United Kingdom (UK) and United States (US) found that a strategy of rapid, reiterative redevelopment was associated with higher levels of successes in new service development and higher service quality. This approach to new service development combines the benefits of the polar extremes of radical and incremental innovation, but with lower costs and risks. This strategy is less disruptive to internal functional relationships than infrequent but more radical service innovations, and encourages knowledge reuse through the accumulation of numerous incremental innovations. The important point is to ensure that in place is a structure which reviews both technical and marketing data taking into account reduction in uncertainty (Wheelwright et al., 1997).

Bérubé and Mohnen (2009) determine the performance for the Canadian enterprises that received grants and tax exemptions. The core activity of analysed enterprises was growing plants. They discovered that the most successful enterprises were the ones which received grants and tax exemptions. The lower is the performance of enterprises that have received only tax exemptions. In addition, the enterprises that have received grants and tax exemptions are much more innovative, have more registered global patents and are more successful in marketing their innovations. Czarnitzki and Lopes (2011) analyzed the effects of the grants in German enterprises. They showed that enterprises that have received grants – both national and directly from the EU or both – have a higher degree of innovation than if these resources would not have been received. They found out that the grants which the enterprises received directly from the EU, had a greater effect than national resources. Most likely, the reason behind is that the average size of grants that are drawn directly from the EU is higher. They also concluded that enterprises that have received grants from both EU and national sources, they have the highest salaries. As far as patents are concerned, the most successful are the enterprises that have
received national resources, or a combination of national and direct EU funding. Most of them make a patent application within the next year t+1.

For enterprises, it is important how to manage its sustainable growth and not to lapse into the trap of excessive growth. Sustainable functioning organizations are becoming the driving force of the market economy (Bertoncelj et al. 2011, 18). Sustainable growth means building a sustainable and competitive economy, that efficiently use resources and reinforcing the competitive advantages of our companies, especially in the production and between small and medium-sized enterprises and raise consumer awareness about the benefits and efficiency of resources (European Commission, 2010a, 15). We talk about a sustainable growth, when in longer time the total revenue and net profit of organization are growing (Bertoncelj et al. 2011, 23). Engel et al. (2015, 10) recognize that the German companies from various industries with its powerful innovative leadership successfully compete with low-cost competitors from around the world. It was found a strong correlation between the powerful innovative leadership and sustainable profitable growth.

2.5 Hypotheses
On the basis of the previous literature, we have set two hypotheses, which are tested:

H1: Performance of enterprises is positively associated with grants from the public tender P4.
H2: Reaching the effects of grants from the public tender P4 is positively associated with innovation in the enterprise.
H3: Enterprises that received grants are having sustainable growth

The performance of the enterprise is measured by financial indicators.

3 Stylized and empirical data facts

3.1 Innovation in Slovenia

Slovenia's Development Strategy (IMAD, 2005) ranks among the most important national development documents on objectives for the 2006-2013 period. The crucial factor is the increased global competitiveness by means of promoting innovation and entrepreneurship.

In Slovenia, in 2010, 49.4 percent of the enterprises were innovative ones (Table 1). For comparison, most innovative enterprises in the EU Member States were in Germany, followed by Luxembourg and Iceland. Slovenia is ranked on 18th place. The government should provide an economic environment where this innovativeness will represent the competitive advantage of enterprises.
Table 1: The Share of Innovative Enterprises in Slovenia and in Other EU Member States in 2010

<table>
<thead>
<tr>
<th></th>
<th>Total number of enterprises</th>
<th>Innovative enterprises (including enterprises with abandoned/suspended or on-going innovation activities)</th>
<th>2010 (in %)</th>
</tr>
</thead>
<tbody>
<tr>
<td>European Union (27 countries)</td>
<td>730,701</td>
<td>386,833</td>
<td>52.94</td>
</tr>
<tr>
<td>European Union (15 countries)</td>
<td>577,702</td>
<td>334,893</td>
<td>57.97</td>
</tr>
<tr>
<td>Germany</td>
<td>127,073</td>
<td>100,743</td>
<td>79.28</td>
</tr>
<tr>
<td>Luxembourg</td>
<td>1,509</td>
<td>1,027</td>
<td>68.06</td>
</tr>
<tr>
<td>Iceland</td>
<td>835</td>
<td>533</td>
<td>63.83</td>
</tr>
<tr>
<td>Belgium</td>
<td>12,481</td>
<td>7,598</td>
<td>60.88</td>
</tr>
<tr>
<td>Slovenia</td>
<td>4,158</td>
<td>2,054</td>
<td>49.40</td>
</tr>
</tbody>
</table>

Source: Eurostat 2014

In the dimension *Innovators*, the Innovation leaders are performing the best. Germany is the overall Innovation leader followed by Luxembourg and Sweden. Innovation systems in these countries are characterised by high rates of firms involved in innovation activities: innovation seems a natural strategy for firms to meet their customers’ demands and to face competitive pressures. This also results in faster employment growth linked to innovation activities. Cyprus, Slovenia and the UK are the weakest performing Innovation followers whereas Greece and Portugal are the strongest performing Moderate innovators. Performance differences between the EU Member States are high for the Innovation followers and Moderate innovators. Within the Innovation followers the best performing country (Luxembourg) is performing 2.5 times as high as the least performing country (the UK). Within the Moderate innovators the best performing country (Greece) is performing 4.5 times as high as the least performing country (Poland). The Innovation leaders and the Moderate innovators perform more equally (European Commission, 2014 b).

Innovation performance in Slovenia has been steadily increasing with a slight downfall in 2012. Slovenia’s relative performance to the EU Member States has improved from 85 percent in 2007 to 93 percent in 2013. The increase in relative performance has moved the country from the Moderate innovators in 2006 and 2007 to the Innovation followers from 2008 onwards. High growth is observed for Community trademarks, Community designs, Non-EU doctorate students and License and patent revenues from abroad. Strong declines in growth are observed in Non-R&D innovation expenditures and Sales share of new innovations (European Commission, 2014 b).

Slovenia has significantly increased its R&D intensity over the last decade, with some fluctuations (European Commission, 2014a). Table 2 presents a slight growth for a percentage of gross domestic expenditure on R&D as a percent of GDP, where Slovenia is above the EU (28 countries)average.

Table 2: Gross domestic expenditure on R&D (% of GDP)

<table>
<thead>
<tr>
<th></th>
<th>2004</th>
<th>2005</th>
<th>2012</th>
<th>2013</th>
<th>Target</th>
</tr>
</thead>
<tbody>
<tr>
<td>EU (28 countries)</td>
<td>1.76</td>
<td>1.76</td>
<td>2.01</td>
<td>2.02</td>
<td>3</td>
</tr>
<tr>
<td>Denmark</td>
<td>2.42</td>
<td>2.39</td>
<td>3.03</td>
<td>3.05</td>
<td>3</td>
</tr>
<tr>
<td>Germany</td>
<td>2.42</td>
<td>2.43</td>
<td>2.88</td>
<td>2.94</td>
<td>3</td>
</tr>
<tr>
<td>Austria</td>
<td>2.17</td>
<td>2.38</td>
<td>2.81</td>
<td>2.81</td>
<td>3.76</td>
</tr>
<tr>
<td>Slovenia</td>
<td>1.37</td>
<td>1.41</td>
<td>2.58</td>
<td>2.59</td>
<td>3</td>
</tr>
<tr>
<td>Finland</td>
<td>3.31</td>
<td>3.33</td>
<td>3.43</td>
<td>3.32</td>
<td>4</td>
</tr>
<tr>
<td>Sweden</td>
<td>3.39</td>
<td>3.39</td>
<td>3.28</td>
<td>3.21</td>
<td>4</td>
</tr>
<tr>
<td>Switzerland</td>
<td>2.82</td>
<td>:</td>
<td>3.13</td>
<td>:</td>
<td>:</td>
</tr>
</tbody>
</table>

Source: Eurostat 2015.
3.2 **Innovation as Factor of a Competitive Advantage**

The EU still lags behind the US and Japan in overall R&D intensity; China is rapidly catching up. The EU has set an R&D intensity target of 3 percent of GDP for 2020, which is below the Japanese target of 4 percent, but in line with those of the US and China (European Commission, 2014a).

The Global Competitiveness Index (GCI) shows that the Slovenian economy is ranked on 63\textsuperscript{th} (with score 4.25) place among the 148 countries as regards the global competitiveness (World Economic Forum, 2014). In the years 2012-2013 it was on 56\textsuperscript{th} place (Schwab, 2012), and in 2011-2012 it was on 57\textsuperscript{th} place; this means that in the recent years Slovenia has been losing global competitive advantage compared to other countries.

The share of innovative manufacturing companies in Slovenia is at 98 percent of the EU-27 level. Problem of Slovenian companies is the small proportion of revenue from product innovation in total revenues (Likar, 2014).

4 **Methods and data**

The relationship between financial indicators and innovation of the enterprises that have received grants from the public tender P4 is investigated using statistical methods. Two effects are measured. First, the financial effects are measured by financial indicators that are accessible through publicly accessible database Bisnode (2012). Through this group of effects, the impact of the grant from the public tender P4 on the financial indicators of the enterprises is examined. Among the financial indicators of a SME are used: turnover, profit, growth in employment, and value-added per employee. Second, the relationship between financial indicators and innovation of the enterprises and employee satisfaction are estimated. This group of effects was measured with data from the survey using written questionnaire.

The Cronbach's alfa was used to measure reliability of the questionnaire. The principal components method was applied to map each variable into a number of new variables and the principal components. This was followed by multiple regression analysis in which the effects between the dependent and independent variables are determined.

4.1 **Written Questionnaire**

For the validation of the H2 set, a written questionnaire was used. The questionnaire was prepared in the web application. The invitation letter and a link to the written questionnaire were sent by e-mail to the enterprises that have received grants from the public tender P4. The written questionnaire was divided into five sections:

1. Basic questions about the enterprise, where it was necessary to answer 10 questions, which were used in the analysis as the control variables. In this context, the enterprise gave a written reply and chose a particular value for a particular question.
2. Innovation, which was divided into the following four dimensions: Innovation culture and climate, Innovation and rewards, Creativity as the basis for innovation, and Innovation performance. There were 22 statements given on the five-point Likert scale, with possible answers from 1 – strongly disagree to 5 – strongly agree.
3. Employee satisfaction, which was divided into the following five dimensions: Overall satisfaction, Salary, Organizational culture, Characteristics of work, and Loyalty of employees. There were 20 statements given on the five-point Likert scale, with possible answers from 1 – strongly disagree to 5 – strongly agree.
4. Reasons for failure to achieve the set goals in the grant application. There were 11 statements given on the five-point Likert scale, with possible answers from 1 – strongly disagree to 5 – strongly agree.
5. Information about the respondent. The respondent answered the four questions regarding age, gender, education and position in the enterprise.

The second and third set of questions are based on the previous research in Slovenia (e.g. Fatur et al., 2007; Fatur and Likar, 2009; Likar and Fatur, 2010).

4.2 Data Collection and Data Processing

Data to test the H1 set were obtained through the portal Bisnode (2015). Returned completed written questionnaires were first examined, and then a database was created in Excel and then the H2 set was tested in the software Statistical Package for the Social Sciences (SPSS17).

The survey data collection approach used is a structured written questionnaire. It included three main types of questions: the respondents wrote the answer, or they circled the answer among given answers, or circled the answer that indicated the intensity of agreement or disagreement with the statement based on Likert scale. The used written questionnaire was accompanied by a cover letter, which explained the aims, objectives and content of research as well as explained the selection approach for the survey’s conduction. The written questionnaire was sent to the enterprises on the list of the recipients of the grants from the public tender P4 by e-mail. The e-mail was sent to the enterprises for the first time on 2nd February 2012. The e-mail to the enterprises that had not responded to the written questionnaire, were re-sent by the e-mail on 28th February 2012. The surveys with the written questionnaire were completed on 11th March 2012. Data collected by the written questionnaire from the enterprises are the primary source of data, which includes nominal, ordinal, interval and ratio variables. Three different types of information about the respondents and enterprises are obtained with the written questionnaire:
- Nominal data give information about the enterprise size, which is used for calculation of the structural shares of enterprises, and about the statistical region, where the enterprises is located;
- Ordinal data measure the variables that determine the innovation and employee satisfaction. Perceptions were measured by using the five-point Likert scale where the respondents’ answers had been ranked with a possibility to give the mark from 1 (strongly disagree) to 5 (strongly agree).
- Interval data are represented by the answers to the questions about the age of enterprise and the number of employees.

4.3 Sample and Units

The sample consists from the enterprises that have received the grants from the public tender P4. Among them are micro, small and medium-sized enterprises or SMEs. They deal with different economic activities and are from each of the statistical regions in Slovenia. The public tender P4 was implemented in the years 2006, 2007, 2008 and 2009. The calculation of financial indicators was made for each of the enterprises that have received grants from the public tender P4. There were 918 successful applications by the SMEs from the year 2006 to the year 2009, of which some SMEs had received more successful applications; therefore there were 793 SMEs that had received grants from the public tender P4 in the 2006-2009 period. In 2012, 55 SMEs exited from the businesses, either being in bankruptcy or insolvent. For 73 SMEs was not possible to obtain the correct e-mail addresses. Thus, the written questionnaire was successfully sent to 665 SMEs: 118 SMEs answered on the written questionnaire, representing 17.3 percent of the sample that have received the e-mail. They represented 14.9 percent of the SMEs, which were successful in the public tender P4.
4.4 The Financial Effects: Testing the H1 Set

As part of the testing the H1 set, a financial analysis of the SMEs that were successful in the public tender P4 was conducted. The financial effects were measured by four financial indicators: total revenues, net profit for the period, average number of employees, and value-added per employee.

For each of the years in the 2006-2009 period, the average increase in the four financial indicators for the SMEs that responded to the written questionnaire was calculated. The number of positive, negative and neutral individual financial effects for the four indicators was calculated. Total revenues, net profit and the value-added per employee for the 2006-2009 period were deflated by the consumer price index, which was obtained from SORS (2012).

4.5 The Principal Component Analysis

The criteria for determining the number of principal components were: Scree plot diagram (where the line breaks), the eigenvalues greater than one, the proportion of explained variance at least 50 percent, and substantive reasonableness.

The purpose of testing the H2 set is to determine the impact of innovation on enterprise's performance. The analysis is based on primary data obtained from the written questionnaire. The H2 set argues that the effects of grants from the public tender P4 is positively associated with innovation in the enterprise, which determines economic efficiency positively. Therefore, in the regression framework, the dependent variable is economic efficiency measured by value-added per employee. The independent variables are the four principal components of innovation in the SMEs: the incentives for innovation, procedures and standards for innovation, innovation as the prerequisite, and ways to innovate. The tested multiple regression equation is:

\[ VAP = a + b_1 \cdot INOI + b_2 \cdot INOP + b_3 \cdot INOS + b_4 \cdot INOIN \]

where:
- \( VAP \) = value-added per employee.
- \( a \) = regression constant,
- \( b_1, b_2, b_3 \) and \( b_4 \) = regression coefficients,
- \( INOI \) = Innovation in the way to innovate,
- \( INOP \) = Innovation as a prerequisite,
- \( INOS \) = Innovation as the procedures and standards for innovation, and
- \( INOIN \) = Innovation as incentives for innovation.

The calculated bivariate regression analysis, where is checked whether the principal component Innovation as a prerequisite actually has a positive impact on value-added per employee, is tested by the following bivariate regression equation:

\[ VAP = a + b_1 \cdot INOI \]

4.6 The Financial Effects: Testing the H3 Set

As part of the testing the H3 set, a financial analysis of the SMEs that were successful in the public tender P4 was conducted. The financial effects were measured by three financial indicators: total revenues, net profit for the period and value-added per employee.

For each of the years in the 2006-2014 period, the average increase in the three financial indicators for the SMEs that responded to the written questionnaire was calculated. Total revenues, net profit and the value-added per employee for the 2006-2014 period were deflated by the consumer price index, which was obtained from SORS (2015).
5 Results of hypotheses testing

5.1 The Financial Effects: Testing the H1 Set

For the testing H1 set, the financial effects were measured by four financial indicators during the years 2006–2009 (Table 3). We calculated both the average increase of financial indicators for the SMEs, which were successful in the P4 application, and the average increase of financial indicators for the SMEs, which replied to the questionnaire. Total revenues, average number of employees and value-added per employee confirmed the positive impact of the P4 grants. Only net profit was negative, especially in 2007.

Table 3: The results testing the H1 set

<table>
<thead>
<tr>
<th>Indicators</th>
<th>Average increase / decrease (in %)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total revenues</td>
<td>14.43 -4.55 9.47 12.03 7.84</td>
</tr>
<tr>
<td>Net profit for the period</td>
<td>21.86 -111.38 2.67 36.61 -12.56</td>
</tr>
<tr>
<td>Average number of employees</td>
<td>16.06 6.54 27.82 5.27 13.92</td>
</tr>
<tr>
<td>Value added per employee</td>
<td>7.55 45.62 3.11 1.89 14.54</td>
</tr>
</tbody>
</table>

For the SMEs that have been successful in the application on the public tender P4, we measured 4 financial indicators with a descriptive value: Positive, Negative, and Neutral. In total, the SMEs had: 1442 positive, 1208 negative and 11 neutral financial indicators. This means that the SMEs, except for the net profit, have achieved a positive increase in financial indicators, thus increasing performance.

Table 4: Financial indicators with a descriptive value

<table>
<thead>
<tr>
<th>Indicators</th>
<th>Positive</th>
<th>Negative</th>
<th>Neutral</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total revenues</td>
<td>362</td>
<td>301</td>
<td>2</td>
</tr>
<tr>
<td>Net profit for the period</td>
<td>244</td>
<td>421</td>
<td>0</td>
</tr>
<tr>
<td>Average number of employees</td>
<td>429</td>
<td>228</td>
<td>8</td>
</tr>
<tr>
<td>Value-added per employee</td>
<td>407</td>
<td>258</td>
<td>1</td>
</tr>
<tr>
<td>Total</td>
<td>1442</td>
<td>1208</td>
<td>11</td>
</tr>
</tbody>
</table>

On the portal of the Statistical Office of the Republic of Slovenia (SORS) is taken information for SMEs that operate in the same business activity as SMEs that have received grants. Accessible data were financial indicators: total revenue, number of employees and value-added per employee. SMEs that operate in the manufacturing sector were successful only in growth indicator for value-added per employee.

Table 5: The average increase / decrease in percentage since the 2006-2009 period for SMEs in the manufacturing sector

<table>
<thead>
<tr>
<th>Indicators</th>
<th>Average increase / decrease (in %)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total revenues</td>
<td>-1.217</td>
</tr>
<tr>
<td>Average number of employees</td>
<td>-2.825</td>
</tr>
<tr>
<td>Value-added per employee</td>
<td>2.245</td>
</tr>
</tbody>
</table>
5.2 The Principal Component Analysis

The principal component analysis of variables for innovation suggested the following four principal components (Table 6):

- The principal component 1: Incentives for innovation;
- The principal component 2: Procedures and standards for innovation;
- The principal component 3: Innovation as a prerequisite;
- The principal component 4: Ways to innovate.

The criteria for determining the number of principal components were: eigenvalues greater than one, Scree plot diagram where the line breaks, the proportion of explained variance at least 50 percent, and substantive reasonableness. The proportion of the explained variance is 60.514 percent. The first component represents 20.991 percent, the second additional 14.912 percent, the third additional 13.846 percent, and the fourth additional 10.764 percent of the explained variance.

Table 6: The principal component analysis - innovation

<table>
<thead>
<tr>
<th></th>
<th>Component 1</th>
<th>Component 2</th>
<th>Component 3</th>
<th>Component 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Planned encouraging socializing inventors (such as professional excursions, club of inventors, etc.).</td>
<td>0.80</td>
<td>-0.04</td>
<td>0.12</td>
<td>0.16</td>
</tr>
<tr>
<td>The most successful innovators are publicly awarded.</td>
<td>0.75</td>
<td>0.19</td>
<td>-0.12</td>
<td>0.23</td>
</tr>
<tr>
<td>We know and use a variety of techniques for generating ideas and implementation of improvements (brainstorming, fishbone diagram, stock problems, etc.).</td>
<td>0.71</td>
<td>0.03</td>
<td>0.34</td>
<td>0.15</td>
</tr>
<tr>
<td>The enterprise has set up a policy of rewarding of innovation. Inventors have access to the necessary knowledge and assets for further development of their creativity.</td>
<td>0.67</td>
<td>0.29</td>
<td>0.14</td>
<td>0.21</td>
</tr>
<tr>
<td>Procedure (approach) for calculating the bonuses to employees is understandable.</td>
<td>0.66</td>
<td>0.17</td>
<td>0.24</td>
<td>0.10</td>
</tr>
<tr>
<td>If in the process occurring unexpected deviations from the normal results we systematically analyze the causes for it.</td>
<td>0.26</td>
<td>0.78</td>
<td>0.22</td>
<td>0.03</td>
</tr>
<tr>
<td>Performance is valued by the agreed objectives and standards. Rewarding of innovation is integrated in system of salaries</td>
<td>0.13</td>
<td>0.58</td>
<td>0.04</td>
<td>0.36</td>
</tr>
<tr>
<td>Innovativeness of individual impact on the variable is part of his salary. Innovation of products and processes is a prerequisite for improving the competitiveness of the enterprise. Creativity is expected, without exception, in every workplace in the enterprise. Innovation is one of the criteria in the individual career progression in the enterprise. For the purpose of innovation (research, awards, promotion, education, etc.) enterprise is annually planning a budget for the necessary resources. There are also informal methods of gathering of ideas, which we register as an innovative proposals (e.g. notebook for writing ideas at morning coffee). For each innovative proposal we check whether if it is possible that a similar solution can be applied anywhere else. The users are involved in the design and planning of new products or services.</td>
<td>0.51</td>
<td>0.51</td>
<td>0.26</td>
<td>-0.14</td>
</tr>
<tr>
<td></td>
<td>0.11</td>
<td>-0.13</td>
<td>0.75</td>
<td>0.08</td>
</tr>
<tr>
<td></td>
<td>0.03</td>
<td>0.18</td>
<td>0.67</td>
<td>0.06</td>
</tr>
<tr>
<td></td>
<td>0.34</td>
<td>0.36</td>
<td>0.57</td>
<td>-0.20</td>
</tr>
<tr>
<td></td>
<td>0.34</td>
<td>0.20</td>
<td>0.57</td>
<td>0.26</td>
</tr>
<tr>
<td></td>
<td>0.29</td>
<td>0.22</td>
<td>0.04</td>
<td>0.73</td>
</tr>
<tr>
<td></td>
<td>0.26</td>
<td>0.45</td>
<td>0.03</td>
<td>0.60</td>
</tr>
<tr>
<td></td>
<td>0.15</td>
<td>0.00</td>
<td>0.47</td>
<td>0.59</td>
</tr>
</tbody>
</table>
5.3 Testing the H2 Set

The estimated regression model in Table V is insignificant at 10 percent level (F = 1.82, Sig. 0.128). The corrected coefficient of determination is 0.028, which means that only 2.8 percent of the variance in the dependent variable can be explained by the independent variables.

Table 7: Regression model

<table>
<thead>
<tr>
<th>ANOVA (b)</th>
<th>Sum of Squares</th>
<th>df</th>
<th>Mean Square</th>
<th>F</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Regression</td>
<td>20.218</td>
<td>4</td>
<td>5.055</td>
<td>1.828</td>
<td>.128(a)</td>
</tr>
<tr>
<td>Residual</td>
<td>312.434</td>
<td>113</td>
<td>2.765</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>332.653</td>
<td>117</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

a Predictors: (Constant), Innovation - ways to innovate, Innovation - innovation as a prerequisite, Innovation - the procedures and standards for innovation, and Innovation - incentives for innovation.

b Dependent Variable: 7. Value-added per employee (VAP)

The regression coefficient for the incentives to innovate is negative and insignificant (Sig. 0.538) (Table 7). The regression coefficient for the procedures and standards for innovation is positive and insignificant (Sig. 0.897). The regression coefficient for the Innovation as a prerequisite is positive and significant at 6 percent level (Sig. 0.056). The regression coefficient for the Ways to innovate is positive and significant at 8 percent level (Sig. 0.077).

Table 8: Regression coefficient

<table>
<thead>
<tr>
<th>Model</th>
<th>Coefficients (a)</th>
<th>Unstandardized Coefficients</th>
<th>Standardized Coefficients</th>
<th>t</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>B</td>
<td>Std. Error</td>
<td>Beta</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>(Constant)</td>
<td>3.585</td>
<td>0.153</td>
<td></td>
<td>23.419</td>
</tr>
<tr>
<td></td>
<td>Innovation - incentives for innovation</td>
<td>-0.095</td>
<td>0.154</td>
<td>-0.056</td>
<td>-0.618</td>
</tr>
<tr>
<td></td>
<td>Innovation - the procedures and standards for innovation</td>
<td>0.020</td>
<td>0.154</td>
<td>0.012</td>
<td>0.130</td>
</tr>
<tr>
<td></td>
<td>Innovation - innovation as a prerequisite</td>
<td>0.297</td>
<td>0.154</td>
<td>0.176</td>
<td>1.932</td>
</tr>
<tr>
<td></td>
<td>Innovation - ways to innovate</td>
<td>0.274</td>
<td>0.154</td>
<td>0.163</td>
<td>1.783</td>
</tr>
</tbody>
</table>

a Dependent Variable: 7. Value-added per employee (VAP)

These results suggest that the innovations increase the value-added per employee as innovation has a positive impact on the value-added per employee, which is consistent with the H2 set.

The corrected coefficient of determination is 10.9 percent (Table 9). The regression coefficient for the Innovation as a prerequisite is positive and statistically significant (Sig. 0.002).
Table 9. Regression coefficient for the Innovation as a prerequisite

<table>
<thead>
<tr>
<th>Model</th>
<th>R</th>
<th>R Square</th>
<th>Adjusted R Square</th>
<th>Std. Error of the Estimate</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>.347(a)</td>
<td>0.121</td>
<td>0.109</td>
<td>1.647</td>
</tr>
</tbody>
</table>

*a Predictors: (Constant), Innovation - innovation as a prerequisite

ANOVA (b)

<table>
<thead>
<tr>
<th></th>
<th>Sum of Squares</th>
<th>df</th>
<th>Mean Square</th>
<th>F</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Regression</td>
<td>27.504</td>
<td>1</td>
<td>27.504</td>
<td>10.143</td>
<td>.002(a)</td>
</tr>
<tr>
<td>Residual</td>
<td>200.654</td>
<td>74</td>
<td>2.712</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>228.158</td>
<td>75</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*a Predictors: (Constant), Innovation - innovation as a prerequisite

*b Dependent Variable: 7. Value-added per employee (VAP)

On the basis of these results can be confirmed that the principal component of innovation as a prerequisite has a positive impact on value-added per employee. The other three principal components do not affect the value-added per employee significantly.

5.4 Testing the H3 Set

For the testing H1 set, the financial effects were measured by three financial indicators during the years 2006–2014 (Table 10). We calculated the average increase of financial indicators for the SMEs, which replied to the questionnaire. Total revenues, average number of employees and value-added per employee confirmed the positive impact on the sustainable growth. Only value-added per employee was negative.

Table 10: The results testing the H3 set

<table>
<thead>
<tr>
<th>Indicators</th>
<th>Average increase / decrease</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total revenues</td>
<td>1.08</td>
</tr>
<tr>
<td>Net profit for the period</td>
<td>1.66</td>
</tr>
<tr>
<td>Value-added per employee</td>
<td>0.96</td>
</tr>
</tbody>
</table>

In total all the enterprises together employed between 2006-2014, 1,003 employees.

6 Findings and implications

EU to its members contributes funds for steady development of regions. This is through a variety of programs and tenders, divided into different area. One of such tender is the P4 grant, which is analyzed for Slovenia. The launched P4 grants are for the purpose of investment in technological equipment. Tenders within the program P4 were published in the years 2006–2009. During these years, eligible investment amount was almost 316 million EUR and the amount of grants was around 135.3 million EUR. The research has focused on the direct effects, i.e. on economic-financial indicators and other effects i.e. impact on innovation. The financial effects are measured by four economic-financial indicators to test the H1 set. In general the SMEs achieved positive financial
impacts from grants from the public tender P4. The SMEs that have been successful in the public
tender P4 on the basis of the three analysed financial indicators are more successful than the average
of enterprises operating in the eligible activities. Thus, the H1 set cannot be rejected. The successful
SMEs are more likely to have capacity to efficiently apply and compete in the public tender P4, which
is further increasing their competitive abilities and the level of economic efficiency.

To test the H2 set, a multiple regression analysis has been conducted using previously estimated
principal components as independent variables. In the H2 set, the SMEs performance is determined by
the impact of innovation. The value-added per employee is significantly positively associated with the
principal component Innovation as a prerequisite, but not with other three components. This means
that the H2 set cannot be only partly rejected.

To test the H3 set, the financial effects were measured by three financial indicators during the years
2006–2014. We calculated the average increase of financial indicators for the SMEs, which replied to
the questionnaire. Total revenues, average number of employees and value-added per employee
confirmed the positive impact on the sustainable growth. Only value-added per employee was
negative.

In our case, 44.1 percent of SMEs that responded on the questionnaire in Slovenia, they have poorly
developed innovation. For comparison, Czarnitzki and Lopes (2011) investigated the effect of grants
in SMEs in Germany. They found that SMEs that received grants directly from EU are more
innovative than SMEs that received grants through national institutions, as was P4. Micro
enterprises, which employ fewer than 10 persons and whose annual turnover and/or annual balance
sheet total does not exceed EUR 2 million, usually do not apply to direct calls from the EU. Most of
them are not qualified for application because they are too small or they have not enough staff for
research activities. They do not have operational capability for implementation of the project. Micro
enterprises are more likely to make the most of revenues from production of well-known products for
known customers, but they do not have their own R&D departments and thus are not investing in an
innovative activity. In most cases, SMEs that have received grants from P4, have standard
classification of activities in the sector C: Manufacturing. The public grants P4 achieved their goal and
have a positive impact on the SMEs performance. These impacts are more reflected in the financial
indicators than on innovation. Managers in Slovenia do not pay enough attention to innovation. For
the most of the micro and even small enterprises, innovation still means upgrading subscriber
documents or plans to the technological equipment capacity in enterprise. Only by increasing the
innovation and number of new innovative products could the Slovenian enterprises raise the level of
quality of products or services to the EU level, which is consistent with the declining or stagnating the

7 Conclusion

The novelty and contribution of the paper is on the assessment of the impact of grants of the public
tender P4 to the economic-financial efficiency and enterprise innovation. This research is the first one
in Slovenia and one of the first in the new EU Member States, which measured the impact of a certain
tender (i.e., the public tender P4) on the achievement of the aims and objectives identified in the public
tender for SMEs for co-financing of purchasing of technological equipment in the 2006–2009 period.
The results confirmed more positive role of public grants for enterprise economic-financial efficiency
performance than for enterprise innovativeness. The results confirmed positive sustainable growth of
enterprises which had responded on the questionnaire.
As public grants are related to budgetary funds and taxpayers, it would be interesting to explore the impact of grants on the financial performance and innovativeness from all grants, not only from the P4. In addition to the importance of the results for research, it has also important policy implications directed towards the implementation of the public support programs and EU directives in order to measures the overall impact of the grants and to explore the specific aims and the effects achieved.

References


IMADR (2005), Strategija razvoja Slovenije (Strategy of Development of Slovenia). Institute of Macroeconomic Analysis and Development, Ljubljana.
