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DETERMINANTS OF INNOVATIONS IN SMALL AND MEDIUM ENTERPRISES: A EUROPEAN AND INTERNATIONAL EXPERIENCE

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This paper focuses on the determinants of innovations in small and medium enterprises (SMEs). SMEs play a decisive role in economic transformation by creating additional workplaces and thence levelling the unemployment, contributing to the local budgets, or promoting innovations and economic growth. Moreover, they play a key role in the integrated development of formal and informal entrepreneurial institutions. Thence, innovations represent an important factor for fostering the growth and development of SMEs and are likely to contribute to their overall success and economic profits. In this paper, we use the data from the selected European Union (EU) countries and employ the empirical model envisaged for singling out the factors that influence innovation in SMEs. We use econometric modelling with several variables in order to determine relationships and draw the causalities. Our results demonstrate that higher competition, investment into technologies and optimisation tend to foster innovations, while obsolete equipment and personnel, as well as financial and administrative barriers tend to present obstacles for

innovations. We also found that it is important for every SME to concentrate on its inner structure, management, skills and ambitions which are required for formulating a clear innovative strategy on a path to successful growth and success on the market.

Keywords: *innovations; entrepreneurship; SMEs; small business; econometrics*

JEL classifications: *L25, P36, Q10, R10*

ДЕТЕРМИНАНТЫ ИННОВАЦИЙ НА МАЛЫХ И СРЕДНИХ ПРЕДПРИЯТИЯХ: ЕВРОПЕЙСКИЙ И МИРОВОЙ ОПЫТ

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Данная статья посвящена детерминантам инноваций на малых и средних предприятиях (МСП). Малые и средние предприятия играют весьма важную роль в экономических преобразованиях, например, помогая создавать дополнительные рабочие места и, следовательно, выравнивая безработицу, а также вносят вклад в местные бюджеты и содействуют инновациям и экономическому росту. Кроме того, они играют ключевую роль в комплексном развитии формальных и неформальных предпринимательских институтов. Следовательно, инновации представляют собой важный фактор, который способствует росту и развитию малых и средних предприятий, а также может способствовать общему успеху и росту экономической прибыли малых и средних предприятий. В этой статье мы используем данные из отдельных стран Европейского

союза (ЕС) и применяем эмпирическую модель, предназначенную для выделения факторов, влияющих на инновации в малых и средних предприятиях. Мы применяем эконометрическое моделирование с несколькими переменными, чтобы определить взаимосвязи и построить причинные и следственные связи. Наши результаты показывают, что более высокая конкуренция, инвестиции в технологии и оптимизацию, как правило, способствуют инновациям, а устаревшее оборудование и персонал, а также финансовые и административные барьеры, как правило, создают препятствия для инноваций. Мы также обнаружили, что для каждого малого и среднего предприятия особенно важно сосредоточиться на своей внутренней структуре, управлении, навыках и амбициях, которые необходимы для разработки четкой инновационной стратегии на пути к успешному росту и успеху на рынке.

Ключевые слова: *инновации; предпринимательства; МСП; малый бизнес; эконометрия*

Introduction

Small and medium enterprises (SMEs) play an important role in the vitalisation and development of national economies, as they create employment opportunities, promote the stability and development of regional economies, generate a large part of the creativity and innovation that stimulates economic progress, encourage competition and cooperation and produce high value-added products, and increase tax revenues through supporting entrepreneurial spirit (Fischer & Nijkamp, 1988; Aoyama, 1996; Janda et al., 2013; Čábelková et al., 2013; Mitrut & Constantin, 2015; Strielkowski & Čábelková, 2015; Abrham et al., 2015; Kuzmin & Guseva, 2016; Fursov et al., 2018; or Oláh et al., 2019).

The future development of SMEs and their contribution to the national economy is closely linked to globalisation and its impacts on the economy. Small and medium-sized enterprises are making a major contribution to the transition from agriculture-led economies to industrial-scale industrial facilities, which can generate a sustainable source of income and improve the development process (Nkwe, 2012; or Slutsky et al., 2016).

Most recently, many promising governmental and public initiatives have recently been launched to support small and medium-sized enterprises in key emerging economies, not only through investment, but also through business leaders, which clearly recognise the role of small and medium-sized enterprises in building a sustainable economy (Kalyugina et al., 2015; Berduygina et al., 2017; Tewari et al., 2018; or Bruhn et al., 2018). Such missions cannot be carried out without greater support - from governments, finance, business schools, consumers, the private sector and civil society.

All of the above shows that innovations are important in SMEs. Innovations and innovative development can boost their success and growth, increase revenues and clear up the market from unnecessary competition. Innovative economic development channelled via SMEs appears to play a key part within this context.

The focus on SMEs promotes inclusiveness and sustainability, as SMEs are both labour-intensive and geographically widely spread, creating jobs for young people, women, or migrant workers in economically disadvantaged areas (Stojanov et al., 2011; or Strielkowski et al., 2016). Research on transitional economies and development has highlighted the need for a strong SME sector, as it is often the backbone of the economy and is the main contributor to employment.

This paper focuses on the determinants of innovations in small and medium enterprises. We are analysing the drivers of SMEs growth and success and run an econometric

model envisaged to reveal the key factors that lead to small business innovativeness and accomplishments.

Role of SMEs in the economy

SMEs are in the focus of the economic policies and initiatives. For example, the European Commission's policy drives are filled with the idea of investing in small and medium-sized enterprises (SMEs) to achieve economic growth and create jobs (Jutla et al., 2002; Jiroudková et al., 2015; or Litau, 2018a). In addition, many international organisations such as the International Labour organisation (ILO) are pushing governments to develop policies that create jobs with adequate wages and promote economic growth based on increased productivity rather than create speculations. Job creation and job satisfaction seem to be very important within this context (Čábelková et al., 2015).

It seems relevant and important here to establish the precise meaning of SMEs, so they are not confused with other forms of enterprise. It has to be noted that European Commission (2003) provides a neat definition of enterprises by various characteristics (see Table 1).

Table 1

Definition and classification of SMEs

Size	Number of employees	Annual turnover	Balance total
Medium	< 250	≤ 50m	≤ 43m
Small	< 50	≤ 10m	≤ 10m
Micro	< 10	≤ 2m	≤ 2m

Source: European Commission (2003).

Formal SMEs contribute to the creation of economies as much as 60 percent of total employment and 40 percent of national income by producing a considerable share of GDP (Chowdhury et al., 2015). With regard to this it becomes clear that the transition to the formal sector can bring significant benefits for SMEs (e.g., better access to credit and government services) and for the economy as a whole (e. g. higher tax revenue, better regulation) (Litau, 2018b). The importance of SMEs can be further illustrated on the example of from 2011, when, after the civil wars in several countries in the Middle East and Africa, the local authorities asked for funding for SMEs to support the growth of the private sector and job creation (Narooz & Child, 2017).

Moreover, SMEs can induce the inclusive growth. The inclusive growth means that the poor or others who are not in the economy benefit from economic growth by participating in exactly the same way as social equity and environmental sustainability issues are taken into account in economic processes such as business, economic policy and financial policies (Rauniyar & Kanbur, 2010). Generally, social small and medium enterprises can choose to expand their activities through organizational growth or small but in a strong alliance with their customers. When social enterprises are established in a strong alliance with customers, suppliers, governments, international institutions and local movements, they are more likely to extend their social impact far beyond the growth required for their organisation.

In addition, it is clear that such affirmative actions as women's participation in the business could benefit from innovative economic development. Therefore, the promotion of women's entrepreneurship and equality of gender in ownership seems positively linked to the promotion of innovation in businesses and the economy as a whole.

Determinants of innovations

It is important to understand and to define what the innovation really might be. Yusupov (2009) shows that innovation have an important role in the economy. Moreover,

there are innovations present both in processes and an innovative environment. With regard to this, Ehrenberger et al. (2015) show that innovations might assume the nature other than technological. It also involves improvements and innovations regarding processes that take place within the firm.

At the beginning, it is important to define the concept of innovation and its many types and forms. It becomes immediately obvious that many definitions are dealing with innovation as a more technological perspective. The problem is that not all innovations start with an invention. Rather than that, many innovations take the form of some improvement.

Eurostat (2011) defines innovations as a new or greatly improved product (a good or a service) that is marketed or introduced into a company from a new or greatly improved process. Innovation is based on the results of new technological developments, new combinations of existing technologies or the use of other knowledge acquired by the company.

Some research has shown that it is one of the most influential innovations in the performance of the company's capabilities, which suggests that it is not attuned to the innovation strategies used by SMEs (Love & Rooper, 2001; or Lund Vinding, 2006). Effective innovation is often reported to be the only significant variable that strengthened the importance of such resources for organizational competitiveness. As SMEs are faced with difficulties in accessing and operating technologies, management and business skills are becoming crucial to innovation.

All in all, it seems that the determinants of technological innovation in small and medium-sized enterprises might be issue like company-wide factors, agglomeration economy and the role of suppliers. Therefore, by studying the individual entrepreneurial factors in regions, one can break down regional demography characteristics (e. g. the identification of ambitious entrepreneurs), institutional components (e. g. the education system) and specific regional attributes of innovations.

Previous research does not include in-depth research on factors that stimulate innovation rather than imitative forms of entrepreneurial activity. It might be that innovative performance and enabling business operations and outputs also play an important role in determining innovations.

Innovation in a particular economy depends not only on individuals (entrepreneurs), networks of innovative companies and research organisations, providers and customers, but also on various institutional factors, such as the government-funded research system, education and financial institutions. Some findings show a broad recognition of the importance of entrepreneurship education, as nearly half of the countries have integrated the goals of promoting entrepreneurship education into their broader strategies.

According to Schumpeter, innovation is the creation of new possibilities for adding value, not only for the typical innovation of products and processes in production, but also for the introduction of market, organisation and resource input (Chuev et al., 2016).

Radical innovation is also more risky and costly and would lead to greater changes in the structure, procedures, products or activities of the organization.

In contrast to radical innovation, incremental innovation usually means less cost and less impact on the company's profit, regardless of the importance of continuous and gradual innovation in the company's competitiveness.

Service is an important factor in hotel provision and, as in other service sectors, the introduction of technology benefits is essential to achieve the efficiency of services and improve the performance of services.

On the other hand, a service differentiation strategy, which involves a greater presence of human resources, is less likely to result in radical innovation, and the choice of incremental innovation is more likely in institutions where the differentiation strategy is based on the adaptation of the service provided, the company adapts.

Therefore, the acquisition of more information will provide a better understanding of the factors determining competitiveness, including innovation.

SMEs priority in innovation become supply, platform, customer, relationship, network which have to do with the production and marketing capabilities of key assets. The least prioritised innovation (supply chain, organization, processes, innovative environment) is linked to the ability of the company to support and harmonise the fundamental capacity of innovation in order to effectively play its role in relation to additional assets.

Rigidity in defining and implementing tasks and skills strengthening operational skills can slow down the development of innovation.

However, as one would expect, they explain only part of their innovation capabilities, revealing the importance of external aspects for innovation.

is an innovative addition to the support services they provide to individuals, using gardening as a tool to improve well – being and help their clients achieve their personal and professional goals.

The theory of the product cycle suggests that internationalisation is a strategy in which companies protect their existing market for mature products or services.

In summary, one can conclude that the innovative activities of established entrepreneurs can also be explained using three major forecasters: level of education, international leadership and development aspirations, as well as some control variables, such as technology, company type, skills, year of establishment, and gender. It appears that there are significant differences between SMEs in various countries and regions, particularly in the areas of knowledge excellence, internationalisation and collaboration with business innovation.

Innovations activities of European SMEs

A strategic response to all the challenges of changing the global business environment can only be to develop an economy based on innovation, knowledge and education. OECD (2019) definition describes innovation as a way to restore and expand the product and market portfolio, such as new design, production and distribution methods, implementation of change in organisation and workforce skills, etc. Innovation is the introduction of new or significantly improved solutions for the product (goods or services), processes, marketing or organization into the practice of the company.

European Commission conducts a large-scale support of SMEs ad promotes activities leading to the increase of innovations among these enterprises (Wu, 2017). One of the main tasks of small and medium-sized enterprises is to strengthen the innovation activities. Attention should be focused on the main factors that influence the innovation efforts in European Union and other counters and on innovation, which is considered to be one of the requirements for successful innovation in small and medium-sized enterprises.

European SMEs have a special role of mediating growth in sales and the steady increase in value in the relationship between innovation and investment growth in the R&D sector. Risk innovation and the impact of internal and external research strategies on the distribution of returns show that for an innovative SME, the use of external knowledge and the protection of its own innovation through is an important strategy.

Various policy measures are available to support research and innovation in small and medium-sized enterprises in the EU: subsidies for gifts and tax credits (deduction), support for cooperation with companies, the provision of public innovation and a more SME-friendly support system. Moreover, European policy-makers are aware that in the case of innovative SMEs with limited resources, it is important to develop partnerships with other companies, universities and research institutes, because they can share with their partners the costs and risks of research and to obtain valuable resources (such as advanced knowledge).

A special case are ICT companies in the ICT industry which are confronted with a highly competitive environment, as the ICT industry is characterised by technological changes and innovations, as well as new chains of values and business models. Customer-led inno-

vation and innovation through services are likely to dominate the types of innovations in these sectors.

Some models of innovation try to represent the procedures of innovation for an area, sector, company or group of companies, including their relationships and behaviour. Innovations include a creative elements, research and development (such as research and development), new processes, new products or services and technological advances. In addition, innovations might be the creation of new wealth or the alteration and improvement of existing resources to create new wealth.

Moreover, innovation is defined as the generation, acceptance and implementation of new ideas, processes, products or services. Product innovation is probably one of the most important processes for many companies, in the EU and outside, as it affects the revenues and margins a company can achieve and positively influences the value of a company (e.g. the growth and survival of individual companies).

Data and the model

Our data comes from the ESA SME database (ESA, 2019) that encompasses a vast sample of SMEs from European countries. Using the contacts from the database, an on-line questionnaire survey was prepared and administered to the randomly selected SMEs. We employed a SurveyMonkey, a specialized software intended for collecting online data. Our selection process was two-fold.

First, we selected every third SME located in every third town of every country in the database. Second, we approached the selected SMEs with a request to fill in the questionnaire. It total, over 2400 SMEs were selected and approached but only 1352 responded and filled in the questionnaire. Some questionnaires were incomplete or contained obvious errors and outliers. After processing the collected data, we were able to obtain a valid sample of 776 questionnaire surveys that were further processed and analysed.

For estimating the relationships among the variables, the linear econometric model was used. The models can be presented in the form of a multivariate statistical model which has the following form (see equation (1)):

$$Y = \beta_0 + \beta_1 X_1 + \ldots + \beta_n X_k + \varepsilon_i, \tag{1}$$

where Y is a dependent variable defined as the number of innovations according to categories was selected naturally as an explained variable being the best available measure of innovations, $X_1, \ldots, X_k$ are the explanatory variables (representing enterprise turnover, age of equipment, number of competitors, technologies, etc.) and ε is the error term. In addition, the model can be further specified and made mode precise using the distinction between the exogenous and endogenous variables:

$$Y_i = \sum \beta_k X_{ki} + \sum \beta_m X_{mi} + \sum \beta_i W_{it} + u_c + \varepsilon_i, \tag{2}$$

where X are the exogenous variables of the small model, Z the extra objective variables of the intermediate model and W the extra subjective variables added to make the improved and refined model.

Overall, a number of econometric techniques were also employed in our econometric model and the analysis of the variables in order to estimate our empirical model. The standard econometric technique employed in the estimations were the ordinary least squares (OLS) which was selected mainly due to its simplicity. Similarly, in order to allow for the heteroscedasticity problems that are quite often present in these types of data and models, robust standard errors are employed hereinafter in all OLS estimations. However, due to the nature of the data and the problems that might arise due to the unknown specifics, quite often the use of generalized least squares is justified, so this technique was

also attempted in order to test all possible variations and to find the model that would be the best of fit.

Thence, the complete list of econometric techniques used for our estimations of the empirical model specified in (1) and (2) included Breusch and Pagan test for the presence of individual community effects, Hausman test for individual location effects, general least squares (GLS) for the estimation of fixed effects and random effects models as well as ordinary least square (OLS) estimations with robust standard errors.

The results of our estimations are conditional on a set of specification and diagnostic tests. First, heteroscedasticity test was conducted, and heteroscedasticity was, in fact, detected, as envisaged previously. Therefore, for the sake of robustness, the econometric technique called "robust standard errors" (RSE) were used. Furthermore, we employed OLS model with robust standard errors in order to reach the higher degree of precision for the results of our model. The explanation of the results obtained in the course of our estimations follows in the next sub-section.

Results and discussions

The results of empirical model estimation are presented in Table 2 that follows. The table in question reports the results of two models involved in our estimations, each of them using different techniques and an altered set of variables.

Table 2

Results of the model estimations (innovation and barriers models)

	Innovation model	**Barriers model**
	RSE	**OLS**
Turnover in the previous year	0.117**	0.283**
	(0.241)	(0.230)
Age of equipment	–0.258**	–0.269**
	(0.228)	(0.238)
Number of competitors	0.251**	0.238**
	(0.227)	(0.217)
Technologies	0.395***	0.410***
	(0.251)	(0.261)
Diversification	0.380**	0.370**
	(0.281)	(0.271)
Product quality	0.424**	0.430**
	(0.248)	(0.259)
Level of education	0.325**	0.315**
	(0.264)	(0.255)
Optimization	0.386***	0.397***
	(0.256)	(0.265)
Number of customers	0.378***	0.372***
	(0.259)	(0.249)
Financial barriers	–0.206**	–0.310**
	(0.247)	(0.258)
Constant	1.682**	1.691**
	(0.369)	(0.367)
Number of observations	776	
R-squared	0.57	0.56

Source: Own results.

All in all, an innovation model with robust standard errors and barriers model using OLS were estimated using STATA statistical software. We used 776 observations in total, with each model consisting of 10 main independent variables, three of which were categories and the rest of them being binary variables.

The results of our analysis came through as expected. First of all, it appears from estimating our empirical model that larger target markets for SMEs export of goods or services help to increase innovations. The same relationship can also be verified and confirmed from the other angle of view, which states that innovations make small and medium enterprises to swell on the territorial basis. These two relationships occur simultaneously and therefore must be connected to each other. In our view, innovations might enable SMEs to compete not only locally but also internationally while at the same time international market impose more commitment and pressure on innovativeness of the offered goods, products and services. Larger markets or more markets mean larger turnover and larger sales which leads to the quicker growth of the SMEs in question. The excessive capital can be spent on innovating further, hence the development there.

Another issue if the obsoleteness of equipment. Company's equipment is often associated with innovations – sometimes investing in the new production lines or technologies becomes a synonym of innovation. It turns out from our estimations that with the increasing age of equipment, there is a rising negative impact on innovations (the negative sign of the coefficient in Table 2). This result comes through as a quite straightforward observation, since newer equipment in the company allows for more innovative ways it can be put to use and production. One more important thing is the existence of competition. And not only that – it appears that growing competition means more motivation to be innovative (provided that the company's manager or owner is aware of the competition and knows it well). Overall, we found that competition has a significantly positive effect (especially when it comes to the higher competition categories) and therefore can be called one of the most important drivers of innovation. And vice versa – markets without strong competition are doomed to stagnation, since companies operating on these markets either have to draw from the Blue Ocean Strategy or are, in most cases, monopolists with nothing to fear. Another explanation for that is that more competitive environment forces firms to innovate more. However, it also has to be considered that some top innovative firm with a unique business agenda and offer (e.g. Apple or Google) can have very few competitors on a given market.

Furthermore, our results yielded that investments SMEs make into technologies and the quality of their products and services yield a strong positive effect on innovations, even when compared with that influence on other variables. Even though investments might be just a proxy for a potential discovery and its successful realization in practice, it is a necessary step on the path for achieving innovations. Unfortunately, the results of our survey and the estimations stemming from our empirical model also revealed that many SMEs simply could not afford to invest because their main goal and the most important point on their agenda was just to make sure they survive and stay on the market.

Last but not least, the variable describing the existence of the barriers for innovation did not prove to be significant. It might be that barriers are not a real obstacle for innovations for most SMEs in our sample. Nevertheless, two actual threatening barriers were identified from our data. These barriers were both market barriers – represented by the competition or insufficient demand – and cooperation with scientific institution which had a negative effect on those firms who got involved in it. Another significant barrier to the innovations in SMEs was the financial barrier. This is quite self-explanatory, since the lack of finances or easy access to loans and credits is the mantra many SMEs in various countries and regions around the world often repeat. Another financial barrier is taxes (either local or those collected by the central governments) – all SMEs tend to complain about taxes but unfortunately there is nothing to be done about it. Seen from the point of

view of the governments and policymakers, one of the most important roles of SMEs is to be good and reliable taxpayers.

Conclusions

All in all, it turns out that SME innovation activities are mainly supported by business entities, motivated by competitive pressure, the need to develop and implement new technologies, improve production, enter new markets or respond to changes in the business environment.

An important indicator that provides an insight into the operation of innovation by type of innovation is the percentage of companies with the total number of companies.

In addition, it appears that the lack of financial resources and the access to these resources constitute one of the main barriers to the development of innovation activities in SMEs. In other words, it is necessary to develop the awareness of innovation in small and medium-sized enterprises.

Moreover, it appears that the lack of innovation infrastructure can also become a problem for developing innovations in SMEs not only in the European Union but also worldwide. This is quite a paradox, because it means that the barrier to innovations are SMEs themselves, or precisely, their inner structure, management, and skills and ambitions of their owners and managers.

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