

DETERMINANTS OF TECHNOLOGICAL ENTREPRENEURSHIP DEVELOPMENT

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ABSTRACT

The paper discusses possibilities offered by cooperation between business and science sphere. It defines the technological entrepreneurship (TE) term, starting with an attempt to explain meaning of entrepreneurship. Then it presents barriers and determinants of TE development. It focuses on four main factors: environment, handled resources, entrepreneur characteristics and innovative development – especially the last one. The main objective of the paper is to emphasize a possibility of applying innovative solutions from science institutions into business sector. The literature review enabled an assessment of the existing knowledge. Statistical data analysis let the author evaluate the level of innovativeness development in Poland against the background of other EU member countries.

KEY WORDS

Technological entrepreneurship, advanced technologies, academic centres, business sector, innovation.

JEL CLASSIFICATION

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INTRODUCTION

Advanced technologies are main sources of development nowadays – not only for the biggest world economies and big organisations, but also for small and medium enterprises (SME). Increasing products' and services' modernity as well as technological innovativeness is a major problem for SME sector companies. One of the conceptions which can aid mentioned goals achievement is called technological entrepreneurship. This concept means a process of providing greater practical utility to research results. It can be accomplished due to effective collaboration between various institutions. These are: academic centres, research and development centres, capital market institutions, other institutions of business environment and enterprises producing and selling hi-tech products.

1 TECHNOLOGICAL ENTREPRENEURSHIP

Technological entrepreneurship (TE) integrates issues relevant to entrepreneurship, innovation and technology management [Ławecki 2014]. Entrepreneurship is most commonly defined as a set of attitudes (actions and reactions), which aim is creating and realising operations enabling specified values gaining in a conditions of risk and uncertainty. It is reflected in taking innovative actions, introducing new makings and technologies as well as unconventional problems solving [Bojewska, 2001].

TE is a specific type of an entrepreneurship phenomenon. It revolves around actions leading up to more effective combination of scientific potential of universities and R&D (Research and Development) institutes with market and business activity. The main goal is to provide optimal conditions for research results commercialisation (discoveries, finding, ideas, inventions, etc.) and its use in enterprises. It can be accomplished due to an effective collaboration between various institutions. These are: academic centres, research and development centres, capital market institutions, other institutions of business environment and enterprises producing and selling hi-tech products [Flaszewska & Lachiewicz, 2013].

Many new technical and technological solutions are developed in universities' workrooms and laboratories and R&D institutes every day. These solutions could be successfully implemented on the market and in the business sector. Discussed issue can be understood as a development strategy based on creating, detecting and exploiting technological chances. Its effectiveness can be assessed by the ability of transforming new technological solutions into economic benefits stream [Wściubiak, 2011].

Technological entrepreneurship is a tool transforming potential of scientific institutions into commodities and services. It increases – directly or indirectly – consumers' benefits and causes faster economic growth in the future. New knowledge is transferred to private enterprises. It raises its productivity and leads to increase in investments and employment (also in the hi-tech fields) and setting up new businesses in the result [Banerski et al., 2012].

TE is a matter of concern for many different areas of economic life, including: fostering enterprises' and regions' development and competitiveness, stimulating processes of transformation and knowledge commercialisation, increasing technological awareness among entrepreneurs [Rostek & Skala, 2016]. In theoretical considerations, there are described not only entrepreneurial conditionings, but also technical factors. These are: function of technology, technical systems or institutional environment – with particular focus on various R&D institutes. Technological entrepreneur should have an ability of predicting technological

changes and its impact on development operations realisation [Shane & Venkataraman, 2003].

In opinion of Kordel [2014] entrepreneur adjusts goals according to owned resources. Therefore, managerial decisions are made mainly in virtue of stocks available at a given time. Environment dynamics have a crucial meaning for resource approach. Kordel distinguishes two basic levels of technological entrepreneurship. Individual level describes technological entrepreneur function, while the second one (organisational) focuses on a function of technological enterprise in the process of TE.

TE requires high qualified employees who are determined to develop their knowledge and improve qualifications constantly. Knowledge and intellectual property constitute the capital of this approach. This is the reason for ranking these companies as a high risk ventures [Bał & Kulawczuk, 2010]. TE mostly relates to the SMEs, then the founder and his/her personality traits are significant. The most important are enumerated below: courage, tendency to take a risk, ability to benefit, no fear of changes, attitude towards success, superior creativity, defined strategy and flexibility.

2 DETERMINANTS OF TECHNOLOGICAL ENTREPRENEURSHIP DEVELOPMENT

Kuratko [2014] detailed five following factors which have the biggest impact on a development of TE. On the ground of it, a parameter called CEAI (Corporate Entrepreneurship Assessment Instrument) which is a measure of entrepreneurship realisation level was created:

1. management focused on a support of top level managers which consists in simplifying and promoting entrepreneurial behaviour (including promoting and fostering innovative ideas);
2. job enabling autonomy – top level managers are obligated to tolerate failures and provide freedom to make decisions. Excessive supervision and control is contraindicated. Responsibility remains with lower levels;
3. rewards – development is possible only by way of systems which enhance entrepreneurial behaviour, emphasize significant achievements and stimulate to further innovative work;
4. no time pressure – research show that availability of non-structural data or free time enables to potential innovators emergence;

5. organisational borders – the extent to which flexibility of the boundaries is perceived guarantees an information flow outside and inside the organisation.

Determinants of technological entrepreneurship development can be divided into two groups: internal and external. The following factors can be ranked in the first group: products' quality, employees and leadership competencies, resource management, value of capital, staff entrepreneurship [Kurowska et al., 2013a].

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Development of TE is determined by:

- innovative risk relevant to the necessity of incurring significant expenses and high proportion of failures in the process of commercialisation new products,
- environment uncertainty enforcing proactive moves, flexibility, agility and assurance that all goals are adjusted to possessed and organised at short notice resources,
- organisational creativity, personality traits of owner and executive cadre, as well as their approach to detecting and creating new needs [Staniec, 2016].

2.1 Role of external environment in technological entrepreneurship development

The success of business idea depends on the environment – inside as well as outside of it. The external environment can be defined as a totality of conditions and mutual relationships of varied phenomena, processes, trends and institution which don't constitute organisational system of an enterprise. It influences behaviour, management processes, made moves, structural solutions and development perspectives of this enterprise significantly [Bruzda & Marek, 2008].

Functions of environment are enumerated below: mobilisation, research and development, financial, systemic and promotional function. These can stimulate as well as inhibit the process of TE. Among the stimulating factors the following can be listed: technological progress, cooperative research, social and economic interest in brand-new

technologies, local and central authorities efforts promoting innovations and new technological solutions, EU grants and profitable fiscal solutions for authors.

One of the TE conception characteristics is occurrence of numerous, synergistic interactions between market and academic sphere. These interactions have crucial meaning for creation and popularisation of innovative products and services. Small and medium enterprises have limited resource potential, therefore, these have to supply (financial, technological, informational and material) deficits with resources from external environment to strengthen their position and expand a sphere of activity. That's why one of the external determinants of TE development in SMEs is these entities' environment. [Kurowska et al., 2013b].

3 INNOVATIVENESS DEVELOPMENT

Many various factors constantly influence TE – positively as well as negatively. Development of mentioned issue is closely relevant to creativity, innovations, enterprise's potential and readiness to implement new solutions.

3.1 Determinants of innovativeness development

Following determinants can be enumerated, among external factors which influence an innovativeness of SMEs:

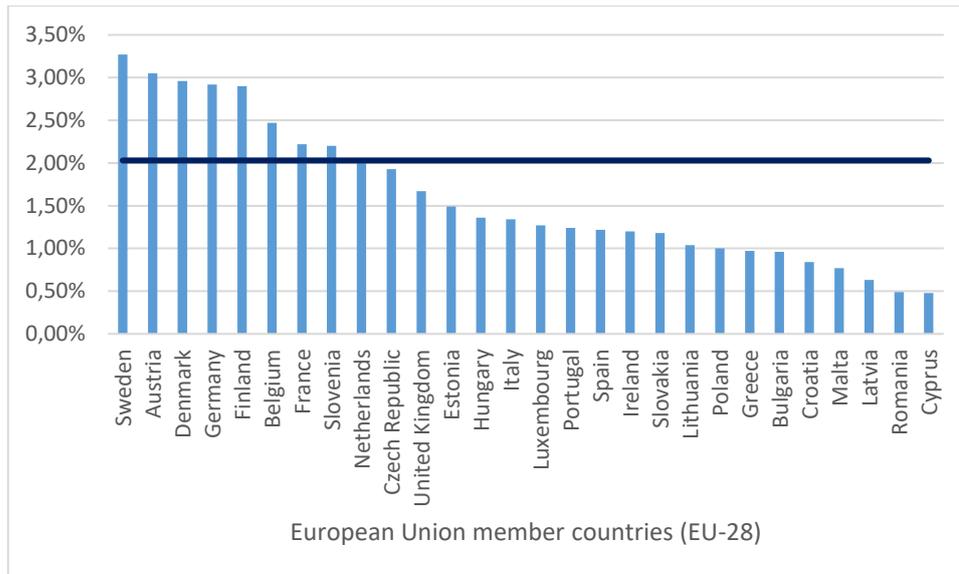
- advance in a regional integration,
- overall level of economic development, investment opportunities, degree of economy openness,
- technological development tendencies and possibility of new technologies' adoption,
- conditionings of socio-economic and legal system,
- principles and practice of economic policy (especially innovation policy),
- situation on a business goods', consumption goods' and services' market,
- other factors coming from enterprise's macro environment [Sosnowska et al., 2003].

Internal determinants of innovativeness can be divided into a few groups depending on factors it results from and is related to. These are:

- factors resulted from the entrepreneur personality – creativity, innovation openness, organisational skills, willingness to distinguish oneself,
- factors related to the entrepreneur experience – education in a given field, knowledge of foreign languages, adapted occupational skills, tenor of work, experiences in managing a company, competence in organising work, material motivation, need to achieve economic success,
- factors related to the company's staff – ambitious, qualified cadre, association with the company, positive assessment of entrepreneur, appropriate organisation motivating to innovative activity, overall working and payment conditions,
- factors related to the direct market environment – customers' expectations, cooperation with consumers, competition's innovativeness, situation on a labour market, no market access limitations,
- factors resulted from company's location – environment protection constraints, necessity to cooperate with municipal corporations, infrastructure configuration, opportunity to have contact with academic or R&D institutions,
- past and current performance results – financial result, accounting liquidity, value of exports, suppliers' accounts payable,
- legal and financial conditionings – laws concerning business activity registration, conditions of loan contracting and credit repayment, customers' privileges, tax law, legal protection of intellectual property [Sosnowska et al., 2003].

3.2 Innovativeness development in Poland

One of the most important factors influencing TE is innovation. Its development is difficult to measure. To that end, the author used statistical data from Eurostat which show the intramural R&D expenditure of GDP (gross domestic product) in percentage. The result of its analysis is shown on the graph (Graph 1). The average value for 28 EU member countries in 2015 was 2,03% and eight countries crossed that line. The highest value was observed in Sweden where the expenditure totalled 3,27%, while the lowest – in Cyprus (only 0,48%). Poland was ranked in the second half of the list, on the quite distant 21st place.



Graph 1 Intramural R&D expenditure – percentage of gross domestic product in EU member countries in 2015

Source: own study based on the data from <http://ec.europa.eu/eurostat/data/database>

The figure below (Figure 1) shows innovation active service enterprises in the years 2014-2016 in Poland by voivodships. The highest percentage of mentioned entities was observed in Lublin Voivodeship (23,3%), the lowest – in Warmian-Masurian and Opole Voivodeship (both 4,8%). The main reason for a disadvantageous position of Poland and not introducing innovation for examined enterprises is just lack of compelling reason to innovate (92,5%). Only 7,5% of them considered introducing innovation, but found barriers too high [www1].

There are many various obstacles to innovative companies' running. Enterprises in Poland (as the share of total innovation active enterprises) found some of them more or less important. The majority (32%) of examined entities considered too high cost of innovation as a crucial barrier. Other mentioned obstacles (in order) are:

- uncertain market demand for your ideas for innovations – 19,9%,
- too much competition on the market – 19,5%.
- difficulties in obtaining public grants or subsidies for innovation – 19,2%,
- lack of skilled personnel in the enterprise – 13,5%,
- lack of external finance for innovation - credit or private equity (including venture capital) – 10,7%,
- lack of partners for collaboration – 9,5% [www1].

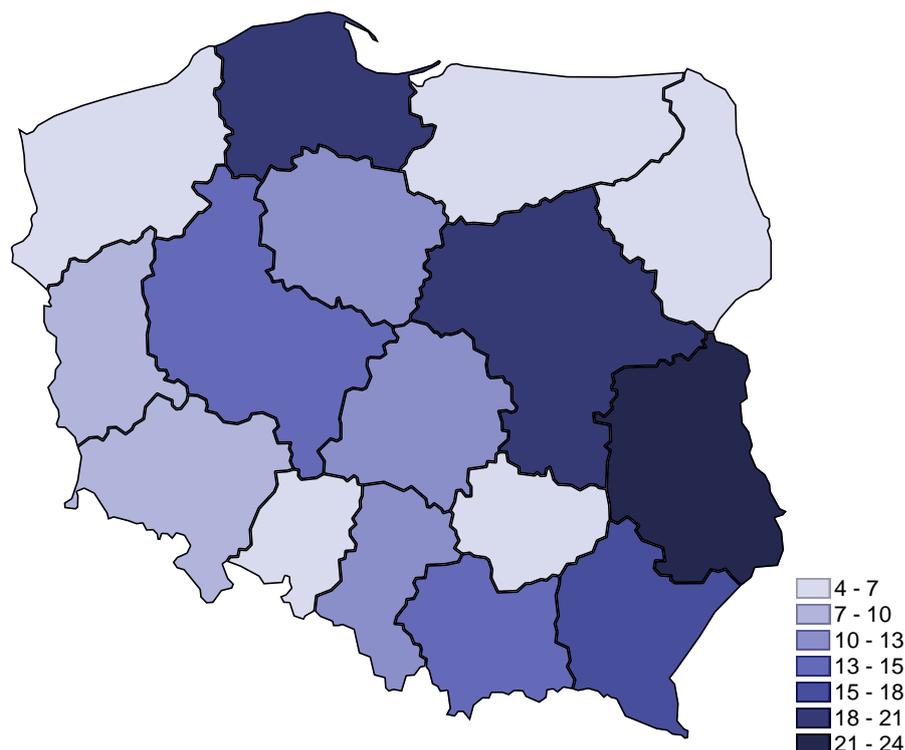


Figure 1 Innovation active service enterprises in the years 2014-2016 in Poland by voivodships

Source: own study based on the data from <http://stat.gov.pl/>

CONCLUSION

Advanced technologies are main source of development nowadays – not only for the biggest world economies and big organisations, but also for small and medium enterprises. Unfortunately many enterprises cannot detect the benefits which derive from innovative technological implementations. Poland comes second to last in the ranking of innovative enterprises in EU member countries (in front of Romania). There are many various reasons for this situation. However, the most frequently mentioned is lack of compelling reason to innovate. Entrepreneurs are not aware of technology potential. That is why the education is so important. Technological entrepreneurship could be a solution for many enterprises which don't make use of innovative solutions. Main determinants which influence its development are connected to environment, resources and competences of entrepreneur.

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