Successful university - industry collaboration as a factor for implementation of Smart Specialization Strategy: evidence from Latvia and Lithuania

Natalja LACE, Gintare RUMBINAITE
Faculty of Engineering Economics and Management, Riga Technical University
6 Kalnciema Str., Riga, LV-1007, Latvia

ABSTRACT

Enhancement of the innovation system, removal of all barriers to collaboration among all process participants – industry, education, and research, as well as legal and financial systems, are important preconditions ensuring transition to the innovation economy and implementation of the Smart Specialization Strategy. It is particularly topical for such new member states of the European Union as Latvia and Lithuania, which need to considerably improve the innovation characteristics of their economies. The aim of the paper is identification of the reasons impeding collaboration between university and industry.

Keywords: innovation performance, smart specialization strategy, barriers, university-industry collaboration

1. INTRODUCTION

University-industry collaboration has become topical for the European countries since adoption of the decision to develop into the most competitive economy in the world [6, 12]. It is particularly relevant for such new member states as Latvia and Lithuania, which have to considerably improve the competitiveness of their economies.

According to the Global Competitiveness Index worked out by the World Economic Forum, Latvia's and Lithuania's economies were ranked the 44th and 36th respectively out of 140 economies in 2015 [21]. Latvia and Lithuania fall behind many European countries, including Estonia (ranked 30th). The rank of Lithuania rose five points compared to the previous position (41st in 2014-2015), at the same time, the position of Latvia deteriorated going two points down (42nd in 2014-2015).

The current stage of development of the national economies is characterized by the growing role of intangible assets and increasing investment into the intellectual capital.

Emerging role of scientific knowledge as a strategic resource and growing influence of technological innovations as the key success factor have led to the situation that at present economic development of the enterprises is determined by the proportion of their production and equipment, which is based on advanced knowledge and contemporary solutions.

The Smart Specialization Strategy as a new approach to economic development through targeted support for research and innovation is aimed to facilitate solving this problem [6]. Efficient implementation of Smart Specialization Strategy is inherently connected with successful university-industry cooperation.

The aim of the paper is to identify the reasons impeding efficient collaboration between university and industry. Research methods include content analysis of research literature, statistical data analysis and survey of the members of business community. The number of survey participants and the lack of opinion of the academic community concerning the role of the barriers hindering efficient cooperation between university and industry can be mentioned as research limitations.

2. INNOVATION PERFORMANCE IN LATVIA AND LITHUANIA

Enhancement of the innovation systems and removal of all barriers to collaboration among all participants in the process – industry, education, research and legal and financial systems – are important preconditions to ensure transition to the innovation economy and implementation of the Smart Specialization Strategy [4, 10].

The following basic problems of the existing innovation systems in Latvia and Lithuania have been identified [4, 10]: 1) the present business models are weakly focused on innovation; 2) weak

collaboration between university and industry, insufficient use of creative and intellectual capital in developing innovations; 3) the existing education system does not ensure conformity between demand and supply of the relevant labor force; 4) insufficient number of employed in research and development of technologies and innovations, inadequate workforce renewal; 5) uneven regional development creates unfavorable business environment and leads to inefficient use of the regional resources.

Innovation indicators of Latvia and Lithuania presented in Table 1 ÷ Table 3 clearly demonstrate that the countries lag behind the general European level.

The tendency to redirect investment to R&D does not allow forecasting that the target value set in the European and national reform documents [11, 12, 15] will be reached in 2020 (see Table 1).

Table 1

Gross domestic expenditure on R&D, % of GDP

Year	Latvia	Lithuania	EU28
2003	0.36	0.66	1.8
2004	0.4	0.75	1.76
2005	0.53	0.75	1.76
2006	0.65	0.79	1.78
2007	0.56	0.8	1.78
2008	0.58	0.79	1.85
2009	0.45	0.83	1.94
2010	0.61	0.78	1.93
2011	0.7	0.9	1.97
2012	0.67	0.9	2.01
2013	0.61	0.95	2.03
2020 target	**1.5**	**1.9**	**3.0**

Source: Eurostat [9].

According to the report Research and Innovation Performance [8], Latvia and Lithuania are at the bottom of the EU rating with respect to indicators of investment in knowledge.

Table 2

Investment in knowledge in 2012

Indicators	Lithuania	Latvia	EU average
New doctoral graduates per thousand population aged 25-34	1.07 (R=20)	0.95 (R=23)	1.81
Business enterprise expenditure on R&D as % of GDP	0.24 (R=24)	0.15 (R=27)	1.31
Public expenditure on R&D as % of GDP	0.66 (R=12)	0.51 (R=19)	0.74

(R)-rank within the EU; Source: [8]

The Innovation Output Indicator, which covers technological innovation, skills in knowledge-intensive activities, competitiveness of knowledge-intensive goods and services, and innovativeness of fast-growing enterprises, is shown in Table 3. Latvia and Lithuania noticeably fall behind many European counties also with regard to this indicator.

Table 3

Innovation Output Indicator 2012

Indicators	Country		
	Latvia	Lithuania	EU28
IOI total*	63.8	57.9	101.6
PCT	0.5	0.4	4.0
KIA	10.3	9.1	13.9
GOOD	29.0	31.9	53.4
SERV	35.6	14.2	49.5
DYN	11.3	12.3	17.9

Source: [3]

*Innovation Output Indicator is calculated as follows [3]:

$$IOI = w_1 PCT + w_2 KIA + w_3 COMP + w_4 DYN \quad (1)$$

where:

PCT – technological innovation as measured by patent applications per billion GDP;

KIA – employment in knowledge-intensive activities as measured by the number of persons employed in those activities in business industries over total employment;

COMP – competitiveness of knowledge intensive goods and services. This component integrates in equal weights shares of high-tech and medium-tech product exports to the total product exports *(GOOD)* and knowledge-intensive service export as a share of a total services exports of a country *(SERV)*;

DYN – employment in high-growth enterprises in innovative sectors.

3. UNIVERSITY - INDUSTRY COLLABORATION: LITERATURE REVIEW

Contemporary economic development challenges call for efficient collaboration between university and industry. It is important to enhance this collaboration to improve the learning process, educate and train the specialists, conduct applied research, transfer knowledge and technologies to develop manufacturing processes and stimulate entrepreneurship.

Understanding of the goals and objectives of the partners is important to ensure successful university-industry collaboration. Universities aim at educating

and training highly qualified specialists and conducting fundamental and applied research. In turn, enterprises generate profit for their owners using innovations and advanced technologies.

Numerous examples of university-industry collaboration have been discussed in literature. Collaboration may be manifested as resource, personnel and information exchange within joint research projects, as well as training and consultation services. The main reasons why universities are willing to collaborate with the industry are the opportunity to improve the process of education, obtain additional funding, improve their reputation and obtain access to research data. Enterprises look forward to cooperation with universities because in such a way they may gain access to technological knowledge, contact highly qualified specialists, use the opportunity to advance professional qualification of their employees, take part in educating and training new staff, gain access to research laboratories and state funding, as well as employ the opportunity to influence educational and research process at the universities [20].

Despite these motivating factors, there are several barriers impeding collaboration between university and industry. The authors have performed content analysis of scientific literature and identified the following barriers.

Table 4
Barriers to university-industry collaboration

Barrier	Quotation and source
Low prestige of applied science	"Traditionally universities have accorded low prestige to applied science and regarded commercially sponsored research as a short term superficial enquiry towards applied objectives." R. M. Davies, 1996 [19]
IP related problems	"32% of the survey respondents noted that intellectual property issues were indeed an insurmountable barrier." "In general, companies such as ours believe that we own the intellectual property developed for us under sponsored research. This view is often not shared by potential university partners." "IP is often a stumbling block for collaborations because many universities want to publish results prior to IP protection, and sometimes will not grant exclusivity of results." "In general, the difficulties that usually prevent a successful partnership [with a university] are (1) intellectual property issues and (2) the university partner's lack of understanding of our business." Bronwyn H. Hall, Albert N. Link, John T. Scott, 2000 [2]
	"University too aggressive in exercising intellectual property rights." Donald S. Siegel, David A. Waldman, Leanne E. Atwater, Albert N. Link, 2003 [5]
	"Potential conflicts with university regarding royalty payments from patents or other intellectual property rights and concerns about confidentiality." Johan Bruneel, Pablo D'Este, Ammon Salter, 2009 [13]
Different goals, culture, constrains	"Lack of understanding regarding university, corporate, or scientific norms and environments." "Business managers asserted that university scientists and administrators do not understand or appreciate industry goals/culture/constraints, while university scientists and administrators believe that industry does not understand or appreciate university goals/culture/constrains." Donald S. Siegel, David A. Waldman, Leanne E. Atwater, Albert N. Link, 2003 [5]
Funding	"Insufficient rewards for university researchers." Donald S. Siegel, David A. Waldman, Leanne E. Atwater, Albert N. Link, 2003 [5]
	"We found that the major barriers related to inappropriate academic systems, poor understanding of industry issues in academia, inadequate governmental support systems…" Mina Tsubouchil, Ryuichi Morishita, etc, 2008 [14]
Funding/low motivation	"Previous experience of collaborative research, as measured by joint publications and

	collaborative grants, is extremely important in explaining both the probability of a university researcher engaging in a great variety of interactions, and the probability of a university researcher engaging more frequently across a larger range of interactions." P. D'Este, P. Patel, 2007 [16]
University-Industry channel is not developed	"Bureaucracy and inflexibility of university administrators" "Poor marketing/technical/ negotiation skills of TTOs" Donald S. Siegel, David A. Waldman, Leanne E. Atwater, Albert N. Link, 2003 [5]
	"Absence or low profile of industrial liaison offices in the university" Johan Bruneel, Pablo D'Este, Ammon Salter, 2009 [13]
Lack of practice and knowledge	"The major barriers to collaboration relate to the inadequacy of particular systems in academic institutions (particularly technology licensing organizations and mobility between industry and academia), the knowledge deficit of academic personnel with respect to industry, the inadequacy of particular governmental support system…" Mina Tsubouchil, Ryuichi Morishita, etc., 2008 [14].
	"So, crossing the BBB as well as the academia – industry barrier has thus far proven to be a formidable challenge, especially because the technological requirements to do so have historically been very much detached from the needs of pharmaceutical companies, where academic researchers are often only focused and trained on limited aspects of drug delivery to the brain and not on the full drug development path." Pieter J. Gaillard, 2010 [17]
	"University research is extremely orientated towards pure science." "Mutual lack of understanding about expectations and working practices." Johan Bruneel, Pablo D'Este, Ammon Salter, 2009 [13]
Psychological phenomena	"Faculty members/administrators have unrealistic expectations regarding the value of their technologies." Donald S. Siegel, David A. Waldman, Leanne E. Atwater, Albert N. Link, 2003 [5]

4. RESEARCH DESIGN AND RESULTS

Results of the content analysis were used to design a questionnaire, which was further used to survey the representatives of business and academic community. The questionnaire included 10 statements (see Table 5), the respondents were invited to rate them with the help of the 5-grade Likert scale: do not agree (1), rather disagree than agree (2), rather agree than disagree (3), agree (4), strongly agree (5). 50 representatives from various business areas from Latvia and Lithuania took part in the pilot research. The biggest part of the respondents – 60% – were representing manufacturing sector, 30% – wholesale and retail sector, 10% – human health and social activities. At present, the survey is being run among the representatives of universities. Upon completion of the survey, it will be possible to compare the opinion of business and academic communities. The results of the survey of the representatives of business community are given in Table 5.

Table 5

Results of the survey of representatives of business community in Latvia and Lithuania concerning the role of barriers to efficient university-industry collaboration

Statements	Average assessment by business representatives
1) University believes that applied sciences have low prestige.	3.02
2) Companies and universities have difficulties in deciding whom the intellectual property created in joint projects belongs to.	2.98
3) Universities disseminate research results before they are protected as intellectual property.	2.68

4) Universities have cultural misunderstanding concerning corporate goals, norms and rules.	3.16
5) Industries have cultural misunderstanding concerning scientific goals, norms and rules.	2.54
6) Governments do not provide enough funding for university and industry collaboration.	3.06
7) Academic researchers have inadequate reward system for conducting research.	2.26
8) Technology transfer offices (TTO) in universities have poor marketing, technical and negotiation skills.	3.10
9) Academic researchers in universities do not have enough knowledge about industry issues.	3.04
10) Faculty members/administrators overestimate the value of their created technologies.	2.5

The results presented in the table confirm the significance of the barriers identified in literature. The authors plan to continue empirical research expanding the range of the surveyed representatives of business community and academic personnel of the universities.

5. CONCLUSIONS

As a result of the research, 10 barriers to university-industry collaboration have been identified. The survey of the representatives of business community from Latvia and Lithuania has confirmed the significance of the barriers hindering successful university-industry collaboration discovered in literature.

The authors plan to continue empirical research covering a larger number of the representatives of business and academic community. Research results are important for implementation of the Smart Specialization Strategy in Latvia and Lithuania.

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