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INNOVATION AND PRODUCTIVITY

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Abstract

Much attention in innovation support programs of the Republic of Latvia is paid not only to enhance public, in particular – young people, awareness on innovation roles to the economy, but also to encourage people to start a business. Most of the innovation support programs have focused on private sector investment, which helps to ensure the recommendation of the European Commission for Latvia in respect of the need to increase public and especially private sector investments in R&D and innovation activities.

The chances of small firms to survive and to be successful are becoming ever more dependent on innovation. Not only product innovation is important to maintain a sufficient market share, but also process innovation to produce below price level, and social innovation to maintain a flexible and durable organisation. The role of innovation in small and medium sized firms relates to the firm's success.

There is a number of hypotheses developed from the scientists of Tilburg university of the Nietherlands for comparison. Hypotheses are empirically checked with data from a survey among 200 entrepreneurs in six countries show the relationship between success, innovation and creativity, some possible backgrounds of creativity and innovation are presented. The role of innovation in small and medium sized firms, in relation to the firm's success is described in this hypotheses.

The next step is the analyzing of the model of technological competitiveness developed by scientists of University of Urbino, Italy. A strategy of technological competitiveness is a key mechanism supporting productivity growth, the key determinants are assumed to include the importance of new product development, market-oriented quality improvements and consumption growth. Model proposes to investigate the effects on productivity of innovation and demand, distinguishing between the mechanisms that are specific to different technological strategies of different companies.

Are described mechanisms acceptable in Latvian economic situation? I would like to answer to this question in my future research work.

Introduction

The title of the paper is "Innovation and Productivity". One of the popular definitions of productivity is: Productivity is the effective use of innovation and resources to increase the

value-added content of products and services. It is the true source of competitive advantage that creates long term economic viability and a better standard of living for all.

The innovation is defined in Business Dictionary as the process by which an idea or invention is translated into a good or service for which people will pay, or something that results from this process.

The Ministry of Economics of the Republic of Latvia is working on a number of innovation support measures, co-financed by the EU Structural Funds. Activities has been continued to support not only development, but also introduction into production new products and technologies.

At the beginning of the paper I would like to describe a number of hypotheses developed from the scientists of Tilburg university of the Netherlands. [7] Hypotheses show the relationship between success, innovation and creativity, role of innovation in small and medium sized firms.

The model of technological competitiveness developed by scientists of University of Urbino, Italy is described the next. There is a lack of sufficient data to test how the model works in Latvian economical situation. [1]

World Bank experts of Europe and Central Asia Region Alfred Watkins and Natalia Agapitova analyze several policy dilemmas to show problems which interfere the emergence of innovations and economic growth, competitiveness, and rising standards of living in Latvia. This dilemmas are described in this paper. [9]

Hypothesis of Innovation, Creativity and Success

Felix J. Heunks from Tilburg University, Faculty of Social and Behavioural Sciences in his article „ Innovation, Creativity and Success" provides the number of hypotheses of the role of innovation in small and medium sized firms, in relation to the firm's success. [7] Because the majority of Latvian companies are small and medium sized firms, this knowledge would be useful. The success of a small firm, measured by its growth, increasing productivity and profits, depends on its innovation. Innovation depends on a combination of flexibility and control. Younger firms are less innovative than older ones. Creativity and innovation tend to share some personal backgrounds, like a high level of education, extraversion, acceptance of challenges, a need for independence, self-confidence, risk-taking and flexibility. Innovation depends on the availability of external capital, information, cooperation and qualified personnel, profits from their flexibility and creativity, and in larger firms more rom the availability of resources like external capital and qualified personnel. Innovation in small firms emphasizes new products and processes, whereas innovation in larger firms emphasizes more R & D.

The Main Ojective-Productivity

Measuring innovation is a complex operation because of its multi-dimensional nature. [1] Not commonly agreed measures exist representing exhaustively all the manifestation of innovation. The indicators used in the study of the University of Urbino, Italy, are for the purpose of distinguishing input and output innovation measures, internal and external to the firms.

The Schumpeterian insight on the variety of innovation is the starting point of this investigation on the productivity effects of different forms of technological change and demand dynamics in specific national systems of innovation. The relevance of two basic mechanisms linking innovation and productivity is tested in the analyzed article. Three different models are proposed, which investigate the effects on productivity of innovation and demand, distinguishing between the mechanisms that are specific to different technological strategies, groups of industries and groups of countries.

The hourly labor productivity is very important indicator to increase the productivity.

Innovation and demand as determinants of hourly labor productivity growth is anlyzed first of all [1]:

$$\pi i\,j = aIEi\,j + bPFi\,j + cCi\,j + dIi\,j + ei\,j \quad (1)$$

π – Compound annual rate of change of hourly labor productivity (Value added per hours worked);
IE – Total innovation expenditures per employee;
P – Share of firms aiming at production flexibility, as a proxy of firms that reorganize their production processes in order to achieve lower costs and greater efficiency;
C – Compound annual rate of change of household consumption;
I – Compound annual rate of change of gross fixed investments;
e – Error term;
i and **j** – identify industries and countries.

The results of the model (1), which includes both mechanisms supporting hourly productivity growth and the two demand variables, are presented in [1] Table 1 by author of research Felix J. Heunks. Column 1 has the findings for 32 manufacturing and service industries of six countries. These variables haven't the same influence on productivity growth across all industries.

Next is **the model for technological competitiveness.** [1]

The **model of technological competitiveness** rooted in product innovations, raises productivity mainly through an expansion of output associated to higher quality products, new markets and demand growth. A strategy of technological competitiveness is a key mechanism supporting productivity growth

$$\pi i\,j = aPAi\,j + bPQi\,j + cCi\,j + ei\,j \quad (2)$$

π – Compound annual rate of change of hourly labor productivity (Value added per hours worked);
PA – Share of firms with patent applications, as a proxy of the ability to develop new products through internal research efforts;
PQ – Share of firms aiming at improving product quality, as a proxy of firms' strategies based on product oriented incremental innovations;
C – Compound annual rate of change of household consumption;
e – Error term;
i and **j** – identify industries and countries.

Table 1

The determinants of hourly productivity growth in European manufacturing and service industries

	All industries	Industries where is prevalent	
		Product innovation	Process innovation
	1	2	3
Total innovation expenditures per employee	0.15** (2.21)	0.24** (2.52)	0.73*** (10.60)
Share of firms aiming at production flexibility	15.97*** (6.52)	-0.94 (-0.23)	9.54*** (7.28)
Rate of change of household consumption	0.13** (2.06)	0.51*** (5.60)	0.34*** (5.07)
Rate of change of gross fixed investments	0.09 (1.64)	-0.06 (-1.06)	-0.02 (-1.99)
Country dummies	Yes	Yes	Yes
Sectoral dummies	Yes	Yes	Yes
F-statistics	22.42***	22.56***	2602.64***
Number of observations	130	68	62

Dependent variable: Compound annual rate of change of Productivity, 1996-2001.
Method: Weigthed Least Squares.
* Significant at the 90% level; ** significant at 95%; *** significant at 99%.
t-statistics in parentheses.
Countries: DE, FR, IT, NL, PT, UK.

Column 2 of Table 1, product oriented industries are characterized by the relevance of the ability to generate innovations (shown by innovation expenditure) and by an even greater influence of consumption growth, but the search for flexibility becomes insignificant; country and industry dummies are included, and investment growth is not significant. [1] In column 3, industries dominated by process innovation maintain the significance of all three variables. Such findings point out the need for a more specific exploration of the mechanisms supporting productivity growth, with the use of the models (2) and (3) for separate groups of industries and countries.

The two specific models are introduced for testing the differences between groups of industries and groups of countries where either new products or new processes are dominant (Table 2). First, the case of product oriented industries is investigated using model (2) in the first regression (column 1). The results show that productivity growth is positively and significantly associated with the relevance of product-related innovations, proxied by the share of firms with patent applications, of a market strategy based on improving product quality, and of household consumption. Country dummies are considered here, while the manufacturing/service dummy appears not significant. The specific variables describing product-oriented innovation efforts and demand growth in consumption provide a more effective explanation of the dynamics of productivity in industries characterized by a model of technological competitiveness.

In explaining the growth of hourly labor productivity, Felix J. Heunks expects that the two technology variables capture the positive impact of specific innovative efforts, while a positive association with consumption growth can identify the expected "demand pull" effects that stimulate innovation and productivity growth.

Table 2

The determinants of hourly productivity growth in producēt and process innovation oriented industries and in "Northern" and "Southern" European countries

	Industries where is prevalent		**"Northern EU"**	**"Southern EU"**
	Product innovations	**Process innovations**		
Share of patent applicants	14.74*** (2.58)		37.31*** (2.75)	
Share of firms aiming at improving product quality	7.70*** (9.74)		8.85** (2.22)	
Expenditures for the acquisition of new machinery per employee		2.39*** (12.17)		5.51*** (9.390
Share of firms aiming at production flexibility		4.83*** (2.56)		9.76*** (9.63)
Rateof change of household consumption	0.24*** (5.93)	0.93*** (25.51)	0.25*** (2.57)	0.20*** (4.42)
Country dummies	Yes	Yes	Yes	Yes
Dummy manufacturing/service sectors	-2.72 (-1.02)	3.68** (2.16)	-6.41 (-1.00)	2.79 (0.62)
F-Statistics	199.36***	524.03***	14.04***	126.61***
Number of observations	70	70	73	70

Dependent variablie: Compound annual rate of change of Productivity, 1996-2001.
Method: Weighted Least Squares.
* Significant at the 90% level; ** significant at 95%; *** significant at 99%.
t-statistics in parentheses.
Countries: "Northern EU": DE, NL, UK; "Southern EU": FR, IT, PT.

There is a lack of sufficient data to understand how this models work in Latvian economical situation:

PA − share of firms with patent applications, as a proxy of the ability to develop new products through internal research efforts – the next key determinant compared with indicators of other countries of EU (Figure 1).

PQ − share of firms aiming at improving product quality, as a proxy of firms' strategies based on product oriented incremental innovations-one ot the key determinants in the model for technological competitiveness. There are no data according the share of Latvian firms aiming at improving product quality. [11] Investment and development agency of Latvia informs that the

Latvian government continues to work on developing a favourable climate for foreign investment by improving the business environment. Legal and administrative requirements are being eased so facilitating cooperation between international and local, non-government partners. The incentives for both foreign and local investors are particularly aimed at encouraging investment in the modernization of manufacturing and the development of innovative technologies. One of the main objectives for the government support programmes developed for 2007-2013 is to attract foreign investment to manufacturing and export as well as to technology sectors. The total amount of State and EU Structural Fund-financing granted for government support programmes up to 2013 is LVL 242.83 million.

Table 3

Compound annual rate of change of hourly labor productivity [10]

	Per person employed (EU-27=100)						Per hour worked (EU-27=100)					
	2000	**2002**	**2004**	**2006**	**2008**	**2010**	**2000**	**2002**	**2004**	**2006**	**2008**	**2010**
EU-27	100	100	100	100	100	100	100	100	100	100	100	100
Euro area	112	111	109	109	109	109	117	115	113	114	114	114
Belgium	138	137	133	129	126	128	*152*	*146*	*144*	*138*	*134*	:
Bulgaria	31	34	35	37	40	42	33	35	35	37	40	42
Czech Republic	62	63	68	70	73	72	52	55	59	59	62	62
Denmark	111	109	109	107	104	109	122	118	118	115	113	118
Germany	107	106	108	109	107	105	124	124	126	128	126	124
Estonia	47	51	58	63	65	70	41	44	49	52	55	62
Ireland	130	135	137	137	129	137	113	119	112	121	117	125
Greece	94	100	101	99	100	96	76	80	82	77	79	75
Spain	104	105	103	103	105	110	103	103	102	104	106	:
France	126	126	121	121	120	120	135	138	130	132	128	:
Italy	127	118	113	111	112	108	116	109	104	102	104	101
Cyprus	86	85	83	84	89	89	76	74	74	76	80	81
Latvia	40	43	46	49	52	55	31	34	37	39	43	47
Lithuania	43	48	54	57	62	63	40	45	50	51	54	55
Luxembourg	177	164	171	180	179	178	:	172	181	193	191	:
Hungary	58	65	68	68	72	71	49	55	57	57	60	60
Malta	97	93	91	90	91	93	85	82	80	81	81	:
Netherlands	115	114	113	115	115	115	137	136	135	137	139	138
Austria	121	118	118	117	115	113	120	115	116	115	115	115
Poland	56	59	62	61	62	67	46	48	50	49	50	54
Portugal	72	71	70	73	73	77	62	61	60	63	64	65
Romania	24	30	35	40	49	48	22	27	32	36	44	42
Slovenia	76	78	82	84	84	81	76	76	79	84	84	80
Slovakia	58	63	66	72	80	83	55	61	64	69	75	78
Finland	116	112	114	111	113	114	113	109	111	108	111	111
Sweden	115	109	116	113	114	113	120	115	121	118	117	116
United Kingdom	111	113	114	113	109	108	*111*	*112*	*115*	*113*	*110*	:
Iceland	104	105	108	99	100	93	:	:	:	:	:	:
Norway	140	132	143	158	157	149	164	157	170	186	184	175
Switzerland	111	107	105	105	110	111	113	111	106	107	113	:
Croatia	62	67	71	74	79	79	:	:	:	:	:	:
FYR of Macedonia	49	47	53	57	59	58	:	:	:	:	:	:
Turkey	54	49	54	62	65	62	:	:	:	:	:	:
Japan	99	99	100	98	96	96	:	:	:	:	:	:
United States	143	141	144	141	138	144	132	131	135	133	131	:

π − compound annual rate of change of hourly labor productivity (Value added per hours worked − one of the key determinants. The information describing situation in our country found in Further Eurostat information, Main tables and Database Eurostat (Table 3).

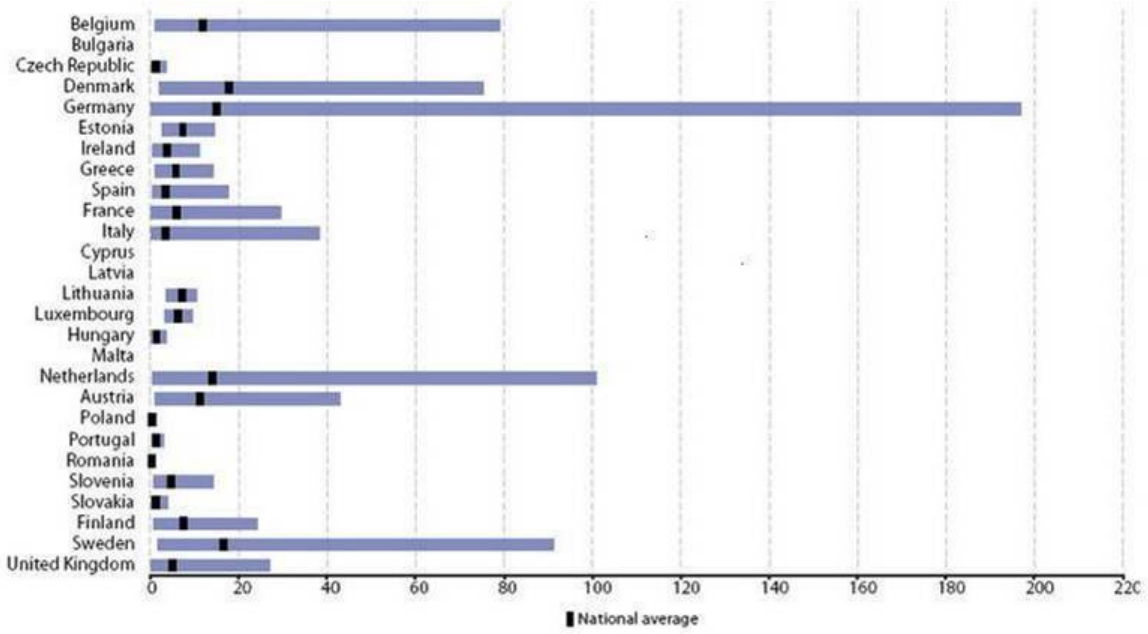

Figure 1. Share of firms with patent applications in biotechnology sector [10]

The next variable in model is:

C − compound annual rate of change of household consumption-information from Further Eurostat information, Main tables and Database Eurostat (Table 4).

The next is **the model for cost competitiveness.** [7]

The model of **active price competitiveness** relies on process innovations and increases efficiency mainly through greater capital intensity, more flexible production systems, and a reduction of labor inputs

In parallel, the third model focuses on the key factors sustaining productivity growth when a cost competitiveness strategy is prevalent and innovation is aimed at developing new production processes; the major dimensions include the acquisition of new machinery incorporating new technologies, and the relevance of firms' reorganization strategies aimed at greater production flexibility. The same demand variable, consumption growth, is again included in order to test the (expected positive) demand pull effects.

$$\pi i\, j = aMAi\, j + bP\, Fi\, j + Ci\, j + ei\, j \qquad (3)$$

π − Compound annual rate of change of hourly labor productivity (Value added per hours worked);

MA − Expenditures for the acquisition of new machinery per employee, as a proxy for embodied technological change;
PF − Share of firms aiming at production flexibility, as a proxy of firms that reorganize their production processes in order to achieve lower costs and greater efficiency;
C − Average annual rate of change of household consumption
E − Error term;
i and **j** − identify industries and countries.

Table 4

Consumption expenditure of households [10]

	As a proportion of GDP (%)			Per capita (PPS)		
	2000	**2005**	**2010**	**2000**	**2005 (1)**	**2010 (2)**
Belgium (3)	51.8	49.7	50.7	12 400	13 400	13 900
Bulgaria	71.3	69.5	:	3 900	5 700	:
Czech Republic (3)	54.6	50.8	51.9	7 100	8 700	10 000
Denmark	47.0	47.6	48.1	11 800	13 200	13 700
Germany (3)	56.2	56.5	56.4	12 600	14 700	15 300
Estonia (3)	60.0	58.4	52.9	5 100	8 100	7 900
Ireland	47.1	43.7	46.5	11 900	14 200	13 900
Greece (3)	75.7	75.5	75.4	12 100	15 500	16 600
Spain (3)	63.1	60.1	58.3	11 700	13 800	14 200
France	55.1	55.6	56.4	12 100	13 800	14 200
Italy (3)	61.1	59.7	60.4	13 600	14 100	14 800
Cyprus (3)	83.4	75.8	74.6	14 100	15 500	17 300
Latvia (3)	60.7	60.3	60.3	4 200	6 600	7 300
Lithuania (3)	65.6	65.3	67.9	4 900	7 800	8 700
Luxembourg (3)	46.6	41.6	37.2	21 700	23 800	23 800
Hungary (3)	56.4	55.3	53.4	5 900	7 800	8 200
Malta	76.5	75.1	69.5	12 200	13 300	13 200
Netherlands	49.2	47.7	44.8	12 600	14 000	13 800
Austria (3)	55.8	56.0	55.4	14 000	15 600	16 200
Poland (3)	63.8	62.7	60.6	5 900	7 200	8 600
Portugal	64.6	65.5	:	10 000	11 700	:
Romania (3)	67.5	68.5	61.1	3 300	5 400	6 600
Slovenia	59.2	57.1	58.5	9 000	11 200	12 100
Slovakia (3)	56.1	56.4	59.6	5 400	7 600	10 300
Finland	47.7	49.4	51.6	10 600	12 700	13 900
Sweden	47.0	46.5	48.3	11 400	12 700	13 500
United Kingdom	62.4	61.6	62.0	14 200	16 900	16 400
Iceland	55.6	53.9	48.8	13 900	15 800	13 500
Norway	40.9	39.5	40.3	12 800	15 600	16 600
Switzerland (3)	58.8	58.3	56.8	16 200	17 300	19 200
FYR of Macedonia (3)	76.9	78.7	78.5	3 900	5 200	6 600
Turkey	74.9	75.6	75.0	6 000	7 200	8 000

(1) 2005, break in series.
(2) Slovenia, break in series.
(3) 2009 instead of 2010 fata.

Source: Eurostat (online dara code: nam_fcs_c)

All variables are expected to enter the models with a positive sign. Country and sectoral dummies will be included in order to account for the importance of national macroeconomic contexts and for the relevance of sectoral specificities. The econometric methodology need to apply in this study.

Conditions That are Troublesome to the Main Ojective – Productivity in Latvia

Europe and Central Asia Region experts of World Bank Alfred Watkins and Natalia Agapitova in their report "Creating a 21st Century National Innovation System for a 21st Century Latvian Economy" recognize that Latvia is struggling with two related challenges. [9] Experts help us to pay attention to **c**onditions that are troublesome to the main ojective-productivity in Latvia. The first is reforming the NIS (National Innovation Systeme) so that it becomes a tool for converting the country's considerable scientific capacity and human capital into an asset for economic growth, competitiveness, and rising standards of living. The second is enhancing competitiveness and productivity in non-high tech sectors. In confronting these twin challenges, Latvian policy makers need to address several strong and policy dilemmas that reforming the NIS (National Innovation System) so that it becomes a tool for converting the country's considerable scientific capacity and human capital into an asset for economic growth, competitiveness, and rising standards of living:

Dilemma No. 1: Basic Research vs. Innovation and Technology Upgrading [9]

Basic research and innovation are not synonymous concepts, especially in countries like Latvia where most enterprises operate far below the technological frontier. Very few Latvian enterprises innovate and most of these firms innovate by importing capital equipment rather than by either conducting basic research themselves or purchasing research services from Latvian or foreign research institutes, innovation and basic research in Latvia are separate, distinct, and discrete activities.

Dilemma No. 2: High Tech Sectors Vs. High Value Added [9]

Contrary to popular opinion, high tech is not always synonymous with high value added, high wages and rapid growth. On the contrary, economies such as Latvia may get more development "bang for the buck" by helping such "low tech" sectors as forestry and food processing increase value added than by trying to develop a few high tech niche products and industries. Experts of World Bank noticed that policy makers, however, tend to view high tech as the surest route to competitiveness and prosperity, mistakenly devote considerable resources to building up a small high tech sector while ignoring the competitive enhancing opportunities available from the much larger non-high tech part of the economy.

Dilemma No. 3: Production and Sale of Knowledge Produced Inside Latvia vs. the Import, Absorption, and Diffusion of Knowledge Produced Outside Latvia [9]

Policy makers should not focus solely on the commercialization of knowledge produced inside Latvia at the expense of helping firms import innovative technology produced outside Latvia and adapting it for local use. This issue is especially critical for Latvia. Total annual

R&D spending in Latvia from all public, private and foreign sources is about equal to one week's R&D spending by one large US corporation. And the total number of R&D personnel in Latvia is equivalent to the total R&D personnel in one mid-sized US laboratory. Thus, even if Latvia boosts R&D spending (as a share of GDP) to the EU average, vastly improves the targeting and efficiency of its R&D spending, and commercializes a large share of those technological innovations generated in Latvian laboratories, Latvia will still be a minor player in the global R&D arena.

Dilemma No. 4: SMEs vs. Large Enterprises [9]

Policy recommendations to improve the functioning of the R&D and innovation systems typically focus on the promotion of high tech SMEs. This is prompted by a desire to replicate the success of Silicon Valley. But it is also based on a misunderstanding of the Silicon Valley phenomenon. True, Silicon Valley is a hotbed of small, high tech startups. But these SMEs did not arise in a vacuum or in isolation from large dynamic enterprises. On the contrary, SMEs which operate without a dense network of linkages to dynamic larger (foreign or domestic) enterprises will most likely not become a source of well paying jobs, economic competitiveness and rapid growth. Instead, they are likely to become little more than low productivity, subsistence operations. Links to dynamic large enterprises may be a critical pre-requisite for the emergence of dynamic SMEs.

Dilemma No. 5: Innovation Vs. Everything Else [9]

Innovation policy covers many issues that at first glance would appear to have little to do with innovation. For example, one influential analysis of factors that influence the "national environment for innovation" refers to such items as "sophisticated and demanding local customers," "home customer needs that anticipate those elsewhere," the "presence of capable local suppliers and related companies,"vigorous competition among locally based rivals," and the "presence of clusters instead of isolated industries." These business environmental factors help to establish a strong demand for innovation. They give local enterprises the incentive to innovate, the knowledge about what innovation could be most profitable, the capacity to assess technology options. In this respect, they are a critical complement to local R&D capacity. Unfortunately, Latvia ranks rather well on indices of scientists and engineers and perform rather poorly on indices of clusters and linkages.Major weakness is relative inability to utilize knowledge and human capital effectively and efficiently.

Dilemma No. 6: Scientists vs. Entrepreneurs [9]

It is generally accepted that entrepreneurs cannot use their entrepreneurial skills to become good scientists. But the converse is also true. Most good scientists cannot use their scientific skills to become good entrepreneurs but his truism is often overlooked when policy makers attempt to promote technology commercialization. Policy makers establish incubators and technoparks to nurture new businesses started and operated by scientists-entrepreneurs. These commercialization institutions frequently fail to live up to their founders' expectations, in part because they tacitly assume that top notch scientists can handle the marketing, sales,

financial, legal and overall managerial tasks performed by a top notch entrepreneurs. This is rarely the case.

Dilemma No. 7: Numerical R&D Targets Vs. Structural Reforms [9]

The Lisbon Strategy calls on EU members to increase average R&D expenditures to 3% of GDP. Achieving this numerical target would entail a seven-fold increase in Latvia's annual R&D expenditures, which currently amount to 0.48% of GDP. An increase of this magnitude over the next six to seven years is clearly unfeasible and, more importantly, without significant reforms in the structure of R&D spending, would be tantamount to throwing good money after bad. Countries with higher per capita GDP do indeed spend more on R&D (relative to GDP) and there is no doubt that increased R&D spending contributes to higher per capita GDP. But it would be wrong to assume that there is a straightforward, mechanistic relationship between increased R&D spending and higher per capita GDP. Simply increasing R&D spending will not lead to higher per capita GDP.

Conclusions

The majority of Latvian companies are small and medium sized firms. [7] The success of a small firm, measured by its growth, increasing productivity and profits, depends on its innovation. [1] Results of the econometric tests show that the models proposed for technological and cost competitiveness are indeed able to identify in an effective way the specific sources of productivity growth in industries and countries, offering a more convincing conceptual approach, and providing strong empirical results.

There are difficulties to use this models to analyze the economical situation of Latvia. The reason is a lack of sufficient data of some of the variables:

PA − share of firms with patent applications, as a proxy of the ability to develop new products through internal research efforts – the next key determinant compared with indicators of other countries of EU (Figure 1) Share of firms with patent applications in Latvia presented only according the biotechnology sector. Biotechnology sector is one of high technologies sectors of Latvia. Europe and Central Asia Region experts of World Bank Alfred Watkins and Natalia Agapitova in their report concludes that contrary to popular opinion , high tech is not always synonymous with high value added, high wages and rapid growth in Latvia. Policy makers, however, tend to view high tech as the surest route to competitiveness and prosperity. They mistakenly devote considerable resources to building up a small high tech sector while ignoring the competitive enhancing opportunities available from the much larger non-high tech part of the economy.On the contrary, economics of Latvia may get more development "bang for the buck" by helping such "low tech" sectors as forestry and food processing increase value added than by trying to develop a few high tech niche products and industries. [12] Latvia with 5% of high tecnology production only on the 82nd place in the world. Major weakness is relative inability to utilize knowledge and human capital effectively and efficiently.

PQ − share of firms aiming at improving product quality, as a proxy of firms' strategies based on product oriented incremental innovations; one ot the key determinants in the model for technological competitiveness. There are no significant results of the Latvian situation

according this variable. Experts of World Bank help us to pay attention to **c**onditions that are troublesome to the main ojective-productivity in Latvia: Not only the lack of data for detrmining the PQ variable of the model but also the numerous of additional problems in Latvian economy identified by experts of World Bank we must to take into consideration in future research work. The problems are: Basic research and innovation are not synonymous concepts, in Latvia where most enterprises operate far below the technological frontier. Very few Latvian enterprises innovate and most of these firms innovate by importing capital equipment rather than by either conducting basic research themselves or purchasing research services from Latvian or foreign research institutes, innovation and basic research in Latvia are separate, distinct, and discrete activities.

Experts recommend to policy makers to promote technology commercialization, to establish linkages between top notch scientists on the one hand and top notch entrepreneurs on the other hand. Investment and development agency of Latvia informs that the Latvian government continues to work on developing a favourable climate for foreign investment by improving the business environment.

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