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Building the System of Innovation Capability Indicators: Case of Latvia

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Abstract

"Innovation" nowadays still is defined and interpreted in different ways. Some say that if you cannot define something you cannot measure it, and if you cannot measure it, you cannot manage it. Measuring innovation requires certain standards, definitions and methodology. Interpreting the measures requires an understanding of the "system of innovation" as a whole.

Innovation is an important component for economic growth and productivity. However, taking into account constantly changing nature of innovation over time, it is extremely difficult to measure innovation. As a result, various indicators that supplement each other have come into common usage; that means one is not a predictor of the other.

This paper aims to discuss and classify innovation capability measures. It is concluded that there is no general best way of measuring the innovation capability. Innovation is a complex process. Individual indicators provide useful insights into the specific components; together, they provide an understanding of the innovation process by which knowledge assets are converted into commercial applications and the linkages between the innovation process actors. In fact, the most interesting results may be obtained using a variety of different approaches at the same time.

Keywords: *innovation, innovation indicators, system of innovation, measurement, national innovation capability*

JEL Code Classification: *C00, D00, E00, O30, O31*

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1. Introduction

Innovation matters for growth (Solow, 1957). Improving knowledge of innovative behaviour of enterprises and its factors is crucial for development of effective innovation policies. Data obtained through innovation surveys have been more and more used to investigate a number of issues on the factors, the effects and some of the characteristics of innovation. For instance, in order to increase the number of innovative enterprises, it is necessary to understand what prevents some enterprises from innovating, what barriers they face, to identify policies to which they would be more sensitive.

The question "Is it possible to measure innovation?" attracts a lot of attention among entrepreneurs, policy makers, scientists and investors. Today, there is a wide range of innovation indicators that aim to measure the output from innovation process, the resources that are necessary for innovation, and the processes that must be implemented to turn innovation inputs into innovative outputs. But before answering all these questions, it is crucial to ask what the term "innovation" actually means and who and what the measurement instruments (indicators) are directed to.

Innovation covers a wide range of activities and processes: markets, entrepreneurship, networks and competition, skills and organisations, creativity and knowledge transfers. Unfortunately, innovation surveys usually pay attention on some of the inputs to innovation, but have little information on the outputs of innovation processes, and tend to measure technology-based activities. In practice, technology-based activities are only a subset of the wide concept of innovation and often more relevant for manufacturing enterprises than for those in services.

Microdata-based indicators reflect the behaviour of individual enterprises and its heterogeneity. Some enterprises innovate, others do not. Among enterprises that innovate, innovation performance differs as some enterprises are highly innovative, other are less so; as well as the types of innovation that enterprises carry out differs (product, process, organisational, marketing innovation).

The concepts of technological (product, process) and non-technological (marketing, organisational) innovation seems to be useful from a practical point of view, nevertheless, they do not fully acknowledge that today's enterprises implement "mixed innovation": certain types of innovation tend to go hand in hand in the same enterprises and complement each other, while other types tend to be independent or to substitute for each other; certain innovative activities (e.g. co-operation or patenting) are more closely associated to certain types of innovation than to others.

Innovation indicators must be considered as basic instruments in private and government decision-making. In the private sector, innovation indicators may be crucial in defining competitive strategies, in turn, in government sector – for developing innovation policy at the national level.

2. Innovation Concept

The term "innovation" is related not only to products and processes, but also to marketing and organization. Schumpeter (1934) described different types of innovation: new products, new methods of production, new sources of supply, the exploitation of new markets and new ways to organize business.

The Oslo Manual defines four types of innovations that encompass a wide range of changes in enterprises' activities: product, process, organisational and marketing innovations. (Oslo Manual, 2005) Innovation (the commercial introduction of a new product or process) is the main determinant of enterprise and industry success and longevity (Kanter, 1983; Sadowski and Roth, 1999; Zahra et al., 1994). Innovation is particularly important for high-technology industries where rapid technological change results in short product life-cycles (Nevens et al., 1990).

The importance of innovation in the services sector and of the services sector's contribution to economic growth is increasingly recognised and has led to a number of studies on innovation in services (de Jong et al., 2003; Hauknes, 1998; Howells and Tether, 2004; Miles, 2005). The services sector is diverse. Howells and Tether (2004) classify services into four groups: services dealing mainly with goods (such as transport and logistics), those dealing with information (such as call centres), knowledge-based services, and services dealing with people (such as health care). While this diversity should be kept in mind, some general characteristics apply to most services.

In the context of private sector, enterprises come up with new products, services, technologies or processes, which are expected to create an economic benefit, for instance an increase in sales revenue. The already common 'smart phone', which acts as a telephone but also has many other functionalities (e.g. as a text messaging device or as a means to access the internet/email services), is a good example. Although, the economic impact of innovation in the public sector is less obvious, because this sector mainly provides public services such as administration, healthcare, education and policing. The same issue is with the impact that public sector innovation can have on the competitiveness of the private sector (Eurostat. Innovation in the public sector).

Public sectors are very different, nationally and across countries. Innovation in the public sector can be split into following types: a new or improved service (health care at home); process innovation (a change in the manufacturing of a service or product); administrative innovation (the use of a new policy instrument, which may be a result of policy change); system innovation (a new system or a fundamental change of an existing system, for instance by the establishment of new organizations or new patterns of co-operation and interaction); conceptual innovation (a change in the outlook of actors; such changes are accompanied by the use of new concepts, for example integrated water management or mobility leasing); radical change of

rationality (meaning that the world view or the mental matrix of the employees of an organization is shifting). (Koch, P. & Hauknes, J., 2005)

To sum up, innovation can appear in any sector of the economy. Innovation is important for the public sector; less is known about innovation processes in non-market-oriented sectors. Innovation is a very wide concept and has many dimensions. Measuring innovation is a very difficult task to perform; but is extremely important as innovation indicators provide decision makers with policy relevant, scale-independent views of complex system of innovation.

3. Do Enterprises Use Innovation Indicators?

The use of well-defined innovation indicators among innovative enterprises is probably not common. The majority of enterprises, especially the larger ones, operate with separate R&D, innovation or business development departments that do not mean that they have formulated an explicit set of indicators that they use in advance of and during the innovation process. A large proportion of the more knowledge intensive enterprises involved in constant innovation in close cooperation with customers, suppliers and possibly business allies. In this case, the innovation process is a fully integrated part of their core activity; mostly they are not interested in innovation indicators.

Nevertheless, when enterprises make strategic considerations for instance they choose to change their strategy, by moving into new markets, or introducing new services and products, these changes are based on a large sets of innovation indicators. In this context, poor innovation measurement results in bad or incomplete information, wasted resources, and a lower return on innovation investments.

4. Why Innovation Indicators at the National Level are Important?

Nowadays technological innovation is one of the main drivers for sustained economic growth, in this context it is important to be able to measure innovation at the national level. National government often uses public policy to stimulate innovation and direct it towards areas defined as national priority areas. Innovation policy should be evidence-based so one should have full knowledge of the problem or subject (i.e., innovation) that is being addressed. Innovation data is essential to better understand innovation and its relation to economic growth; to provide indicators for benchmarking national performance. How much innovation is going on? Is this the right amount of certain type of innovation? Which are the main factors hampering innovation activity? These and plenty of other questions require the ability to measure innovation.

5. Innovation in Figures

Among all the countries participated in the CIS2010, Latvia was one of the countries where the lowest innovation activity was observed – 29.9% of enterprises with innovation activity were found.

One of the five headline targets of Europe2020 Strategy is to achieve R&D intensity (R&D expenditure as a percentage of GDP). In 2011, the level of R&D intensity in the EU-27 was 2.03%. Despite an increase on the 2010 figure (2.01%), it was below the figures recorded in Japan (3.36% in 2009), South Korea (4% in2010) and the United States (2.87% in 2009), but higher than in China (1.7% in 2009). Latvia had the lowest R&D intensity in 2011 among Baltic States (Latvia- 0.70% of GDP, Lithuania-0.92% of GDP, Estonia- 2.38% of GDP). In many of the countries under review, the 'manufacturing' sector represented the greatest share of business enterprise R&D expenditure. This was particularly the case of Germany, Slovenia, Finland and Sweden, where 75% or more of R&D expenditure by the business enterprise sector was devoted to manufacturing. However, eight other European Union Member States (Bulgaria, Estonia, Ireland, Cyprus, Latvia, Lithuania, Portugal and the United Kingdom) saw more than half of their expenditure go on the 'services' sector of the business economy.

The breakdown of business enterprise R&D expenditure (BERD) by size finds out that enterprises with more than 250 employees commonly invest the most in R&D. In Germany, Luxembourg, Finland and Sweden, such large enterprises accounted for more than 80% of BERD. On the other hand, in Bulgaria, Estonia, Spain, Cyprus, Latvia, Malta and Romania, large enterprises accounted for less than 50% of BERD (Science, technology and innovation in Europe, 2013).

6. Innovation Indicators in Latvia

Since 2002 Latvia participates in the Community Innovation Survey (CIS). The survey is designed to monitor the progress of innovation activity in Europe and gives the possibility to understand better the innovation process and to analyze the links between innovation and economic fields such as competitiveness, employment, economic growth. The survey is carried out every two years (Science, technology and innovation in Europe, 2013).

The Commission Implementing Regulation (EU) No 995/2012 of 26 October 2012 laying down detailed rules for the implementation of Decision No 1608/2003/EC of the European Parliament and of the Council concerning the production and development of Community statistics on science and technology lays down detailed rules concerning the production of European statistics on science and technology. In accordance with this Regulation Member States shall compile the innovation statistics shown in the Table 1.

In accordance with this Regulation, "Beyond the statistics listed above, Members States may compile additional statistics (including their breakdowns) in accordance with the main themes listed in the Oslo Manual. Inclusion of these additional statistics is decided in close cooperation with Member States and incorporated in the harmonised survey questionnaire" (Commission Implementing Regulation (EU) No 995/2012). Until now, Latvia did not use an opportunity to collect an additional data on innovation.

Table 1: Variables for Innovation Statistics

Variable	Title	Comments
1	Number of innovation active enterprises	As absolute value and as a percentage of all enterprises
2	Number of innovating enterprises that introduced new or significantly improved products, new to the market/new to enterprise	As absolute value, as a percentage of all enterprises and as a percentage of all innovation active enterprises
3	Turnover from innovation, related to new or significantly improved products, new to the market	As absolute value, as a percentage of total turnover and as a percentage of total turnover from innovation active enterprises
4	Turnover from innovation, related to new or significantly improved products, new to the firm, but not new to the market	As absolute value, as a percentage of total turnover and as a percentage of total turnover from innovation active enterprises
5	Number of innovation active enterprises involved in innovation cooperation	As absolute value and as a percentage of innovation active enterprises
6	Innovation expenditure	As absolute value, as a percentage of total turnover and as a percentage of total turnover from innovation active enterprises
7	Number of innovation active enterprises that indicated highly important objectives of innovation	As absolute value and as a percentage of all innovation active enterprises — optional
8	Number of innovation active enterprises that indicated highly important sources of information for innovation	As absolute value and as a percentage of all innovation active enterprises — optional
9	Number of enterprises facing important hampering factors	As absolute value, as a percentage of all enterprises, as a percentage of all innovation active enterprises and as a percentage of non-innovation active enterprises — optional
10	Number of innovating enterprises that developed the innovations itself or together with the other enterprises/institutions	As absolute value and as a percentage of all innovation active enterprises

Source: The Commission Implementing Regulation (EU) No 995/2012 of 26 October 2012

Although in authors' opinion some improvements should have done in order to improve innovation survey in the case of Latvia:

• Currently CIS filters out non-innovative enterprises early in the questionnaire, and thus collects little or no information on them. In authors' opinion, more information is needed on non-innovators (their skills, training staff, etc.) to make it easier to understand why certain enterprises innovate while others do not. Policy-makers need this information to develop policy that aims at changing non-innovative into innovative enterprises.

- CIS asks on the effects of process and product innovation (e.g. cost reductions, greater productivity and flexibility, increase in turnover, increase in profit margins etc.), this information is needed in order to gain a more complete view of the effect of innovation on the economy. Currently only the share of new products in turnover is covered. The same type of questions about effects of organizational and marketing innovation is required.
- To find out the most suitable criteria for high-growth innovative enterprises to include them in the sample as high-growth enterprises in the economy represent a small proportion of the business population. Growth Module included in CIS should be developed in order to gain information on innovation impact on growth of the enterprises.

7. The Latvian System of Innovation

As the innovative performance depends on the preconditions for innovative output given by the institutional and socio-economic structures of the system of innovation as a whole, each country should develop its own system of innovation as each country has its own institutional profile depending on the governance regime for enterprises, the organisation of the university sector, the level and orientation of government-funded research, priority sectors etc. With a richer understanding of system of innovation concept, it may then be possible for policy-makers to develop policy recommendations that help to produce more systemic and effective system of innovation in Latvia (Jesiļevska & Šķiltere, 2013). A macroeconomic aspect of innovation becomes increasingly important because of the nature of innovation characterized by diffusion, displacement, creation and destruction of goods, services and processes across time period and industries. Broadly speaking, an innovation system consists of individuals and organizations that directly and indirectly invest time and energy in the production of scientific and technical knowledge. This knowledge flows and recombines in complex ways (Kline and Rosenberg, 1986).

Looking for some indicators to measure innovation performance the several levels of innovation performance should be taken into account. (Figure 1)

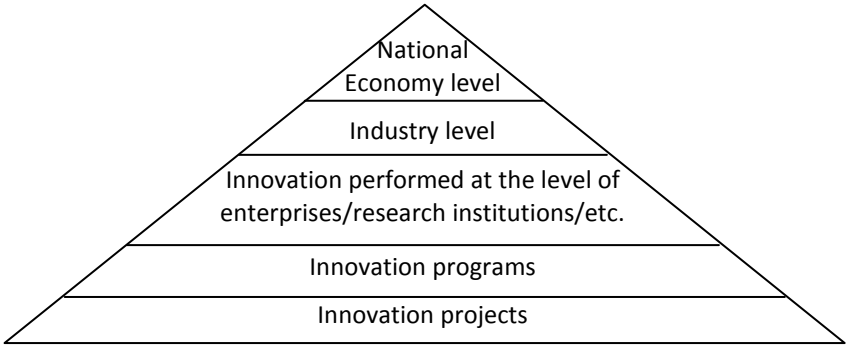

Figure 1: Levels of Innovation Performance (Authors' Construction)

Figure 2 shows the main actors of innovation system and their linkages in Latvia. In can be concluded that the system of innovation is part of a larger economic and political system composed of sectors like government, industry, university, enterprises, their linkages and environment.

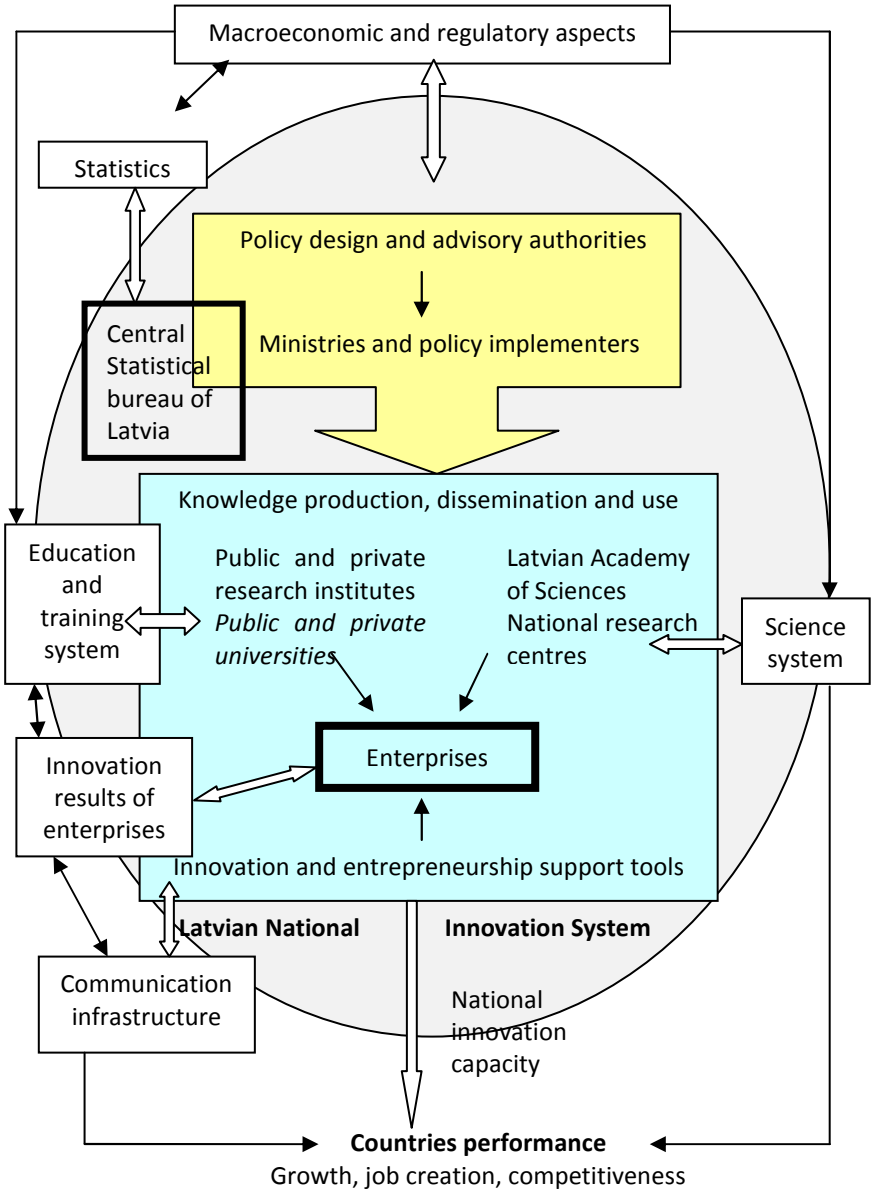

Figure 2: Latvian System of Innovations (Authors' Construction)

The authors propose the following definition: the national innovation system is the system of close co-operation between private and public enterprises, universities, private and public research institutions, and government bodies aiming at developing innovation in accordance with consumers' needs for new or developed products or services (Jesiļevska & Šķiltere, 2013). The quality of this co-operation, strength of the communication infrastructure, education and training system and science system, macroeconomic and regulatory aspects determine the state of the national innovation capacity and in turn lead to national economy growth, job creation, and competitiveness.

Several actors and factors should be taken into account while analysing innovation systems approach: economic and legal framework conditions like taxes, funding, laws, which can be directly or indirectly steered by the political system, social framework conditions etc. Enterprises and branches play central roles which are summarized in the industrial system, education and research offer crucial contributions. Enterprises and their innovative activities are in the core of the innovation system as they are actors that bring new products, new applications and new business models onto the market and make novelties available to consumers.

Not only research results elaborated in universities and public research institutions need to be transferred to the industrial system by intermediating mechanisms and institutions (Kulicke et al. 2008). The educational system, which is itself embedded in an environment of political, social and economic systems, is of special interest. At the same time it is a part of the environment for the other systems. The educational system provides skills and human capital that are used in the research system and is closely related to the labor market and the industry system.

Moreover, the finance – innovation relationship gains additional importance in light of the recent financial crisis, where considerable amount of illiquidity was witnessed (Tirole, 2011). Consumers, the society, political institutions, or the research system might initiate innovations (Moors et al. 2003).

An innovation – friendly environment is another key success factor. Both governments and the society as a whole do play a critical role. Governments support innovation by establishing an efficient science and education system, and by promoting research and innovation in enterprises.

8. Principles of Building the System of Latvian National Innovation Capability Indicators

In order to describe and analyse system of innovation, or to judge its competitiveness, several factors and their various dimensions must be considered in appropriate figures, that is why there is a need of building the system of National Innovation Capability indicators.

In order to build the comprehensive, objective system of National Innovation Capability indicators, the following principles should be followed:

- The scientific principle – indicators should be based on scientific evidence and should consider both global and local interests;
- The practical principle – while designing system of indicators the actual level of innovation should be taken into account, quantitative indicators are used as more as possible, qualitative indicators also need to be quantified indirectly, so as to give great convenience to practice.
- The principle of continuity – as innovation is a continuous process, static indicators could be used to reflect the current level of innovation, the dynamic indicators could be used to predict the future development prospects of innovation capability.
- The principles for choice of indicators – being measurable or quantitative, reflecting comprehensive capability for a nation performed in whole process of innovation from input to output, focusing on competitiveness in innovation, taking into account data availability etc.
- The system approach – to provide an understanding of the innovation process as a whole.

Two basic approaches to measuring innovation exist – the indicators approach and the modelling or econometric approach (Grupp and Maital, 2001). These two approaches differ in the research communities that use them and simultaneously in the models that guide the collection and analysis of data (i.e. measurements).

Wonglimpiyarat (2010) defines that an innovation capability refers to the ability to make significant improvements and modifications to existing technologies, as well as to create new technologies. The analysis of the innovative capability performance is based on five dimensions: (1) organization innovation capability (capability to accept novelties, provide new knowledge to employees, etc.), (2) process innovation capability (capability to adjust the process at all levels concerning the production process, logistics, etc.), (3) service innovation capability (capability to bring new knowledge or technologies to develop the new service), (4) product innovation capability (capability to bring new knowledge or technologies to develop the new product innovations) and (5) marketing innovation capability (capability to implement a technologically new or improved product/process for the operating market).

According to the Oslo Manual, the most significant innovation capability is the knowledge accumulated by the enterprise, which is mainly embedded in human resources, but is also in procedures, routines and other characteristics of the enterprise (Oslo Manual). There are many difficulties in measuring innovation capabilities, since it is necessary to measure knowledge that is not codified, but "stored" in individuals' minds or organisational routines. At the same time, it is not easy task to obtain reliable data from enterprises about the exchange of knowledge with other individuals or organisations.

Innovation capability in the private sector have influenced the public sector to begin practicing innovation seriously, so nowadays innovation can appear in any sector of the economy. Since much of the studies on innovation are focusing on the private sector, authors propose the following definition: an innovation capability refers to the generation of innovations in business and public sector. In this context, the five dimensions proposed by Wonglimpiyarat could be supplemented by the sixth one that is public sector innovation capability (capability to implement novelties in the public sector).

National innovation capability should be performed throughout process of innovation from input to output, so the variables to measure national innovation capability can be divided into two groups (see Figure 3): input variables for innovation and output and influence result from innovation. In turn, input for innovation can be characterised by three determinants: innovation capacity, innovation resources and innovation environment. Output and influence result from innovation can be characterised by: intellectual property, scientific and technological progress, influence results of eco-innovation, innovation products output capacity measures.

Innovative capacity denotes the ability to generate new knowledge, new technology and new artefacts and to apply these novelties in a useful way. The concept of innovative capacity evaluates not only the current capabilities to innovate but also the innovative potentials that may affect innovativeness in the longer period of time (see Furman et al. 2002). The following types of innovative capacity can be distinguished: innovation diffusion capability, manufacturing capacity, innovation environment support capacity, and innovation resources input capability.

Indicators to measure **innovation resources** could be the following: R&D intensity, number of R&D personnel, number of researchers, share of scientific research institutions of enterprises etc.

The majority of studies that examine the link between innovation and performance use R&D expenditure as a proxy (Parasuraman and Zeren, 1983; Franko, 1989; Morbey, 1989). Others have used patents as a proxy for innovation (Pakes and Griliches, 1984; Mansfield, 1986). But, in practice there are problems with both measures. Patent data are useful for understanding certain innovation-related strategies, but they cannot measure the full extent of innovative activities and suffer from some limitations. R&D expenditure is an input into the innovation process but not a measure of innovation outcomes. It is well known that much R&D spent on projects ultimately has no commercial value (Mitchell and Hamilton, 1988).

R&D intensity is very often considered as the basic input of industrial innovation. As such, it has been included in many empirical studies of the determinants of innovation and has usually come out positive and significant (see Cohen, 1996). However, several papers have pointed out that the R&D investment of small enterprises may often be underestimated or that not all innovations rely on R&D investment.

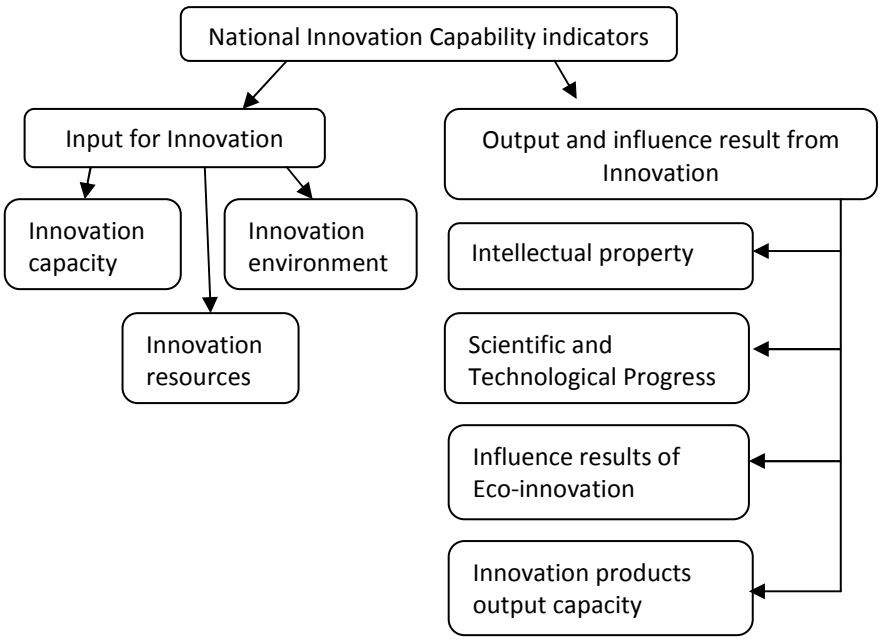

Figure 3: Latvian Innovation Capability Indicators (Authors' Construction)

Innovation environment is probably especially sensitive to the degree of protection of intellectual property rights; the extent of tax-based incentives for innovation; competition policy; market regulations; the development of financial markets; and the openness of the economy to trade and investment. Recent OECD studies[1] have found empirical support for the following proposals: a strengthening of intellectual property rights leads to an increase in the propensity to patent; tight product and labour market regulations can reduce significantly innovation activity; the propensity to patent is sensitive to foreign investment restrictions; stable macroeconomic conditions and low real interest rates help to foster innovation activity; developed financial systems, especially equity-based ones, are associated with greater innovation activity. Innovation environment can be measured by the following indicators: Gross Domestic Product (GDP) per capita; strength of protection for intellectual property; share of GDP spent on higher education; share of international patents; full-time equivalent researchers and R&D expenditures in all sectors of economy etc.

Ultimately, the key **outcome measure** of innovative activity is the success of the enterprise. Its success can be measured by profits, revenue growth, share performance, market capitalization or productivity, etc. All these indicators have drawbacks (Gow and Kells, 1998) and can be caused by factors other than the

[1] http://graphics.eiu.com/PDF/Cisco_Innovation_Methodology.pdf

innovativeness of the enterprise. An alternative possible measure of innovative output is to develop variables for the number of new or improved products introduced.

One of the potential sets of output measures are **intellectual property (IP)** statistics, such as patents, trademarks and designs. A criticism of using patent data as an output measure is that patents do not necessarily represent a commercially exploited innovation. Intellectual property measures can also be considered as an input to the innovation process. The use of patent data has been reviewed by Griliches (1990). Griliches states a key problem with using patent data as an innovation output measure as follows, "inventions that are patented differ greatly in their quality" (Griliches, 1990, p. 1669). Moreover enterprises often choose to keep innovations that are commercially sensitive a secret; the propensity to patent may also depend on the costs of patenting; and many patents may never be implemented commercially. As a result, patents do not necessarily represent a commercially exploited innovation as some researchers have considered patent and other intellectual property data as input indicators rather than outputs (Griliches, 1990). Moreover, patent protection does not guarantee that the inventor can prevent competition from others, either legally by inventing around the new technology, or illegally by infringing the patent. Several studies have shown that patents do not confer substantial protection in many industries (see, e.g., Levin et al., 1985, Hall and Ziedonis, 2001). To sum up, patent data has the following shortcomings:

- Not all inventions are patentable.
- Patentable inventions are not all patented, for the following reasons: different industries have different propensity to patent and the propensity to patent changes over time; patenting is a long and often expensive process; many enterprises prefer to use other forms of protection, such as non-disclosure agreements.
- As many inventions require a significant time and expense for development before they are commercialized, not all patented inventions are converted into commercial products or processes.
- Counting the number of patents alone ignores the vast disparity in their commercial values, as in practice some licenses on these patents bring a lot of money in royalties while others may bring nothing. (Innovation Analysis Bulletin, vol. 3, No. 3, October 2001)

In the context of measuring **Scientific and Technological Progress**, the following breakdown of technological level of innovation can be used: minor variation or differentiation of technology, significant variation or differentiation of technology, modification of existing technology, radically new technology. Nowadays according to the CIS methodology no breakdown is used. Proposed breakdown will help to evaluate the significance and the level of technological progress. Scientific and Technological Progress is characterized by indicators of international technological exploitation and generation like international trade, technology trade, technology-

related foreign direct investment, indicators of technological collaboration (research corporations, technology exchange agreements, R&D contracts etc.).

Influence results of Eco-innovation can be measured by number of eco-innovation projects, environmental benefits for innovative projects performed (achieving measurable reduction in the greenhouse gas emissions and in resource efficiency (CO2 in tonnes, waste in tonnes, energy in kW/h etc.), the range of eco-innovative products, services and technologies in the market, new clusters or joint-ventures based on eco-innovations (number of companies involved).

One of the most direct measures of the impact of innovation is the proportion of sales and exports attributable to the new products and processes classified under **innovation products output capacity**. The following are the indicators to measure output capacity of innovation products: new product sales revenue divided by total sales revenue; total inventive patents divided by applications; number of scientific papers published; GDP; share of exports in high-technology industries. Several researchers have increasingly paid attention to an organisation's ability to identify, capture, create, share or accumulate knowledge (Jang, Hong, Bock, & Kim, 2002; Michailova & Husted, 2003).

An innovation system is composed of individuals and organizations that directly and indirectly invest time, energy and resources in the production of scientific and technical knowledge. The system of Latvian National Innovation Capability indicators could be used to rank members of this system. As innovation is a complex process and system of innovation consists of several actors, the most interesting insights can be obtained using a multitude of different approaches at the same time.

9. Conclusion

An innovation is considered to be the main driver for the economic growth by the economists (Solow, 1957). Innovation can not only make use of available resources, improve efficiency and potential value, but also bring new intangible assets into organization. Enterprises with greater innovativeness usually are more successful in responding to customers' needs and in developing new capabilities that allow them to achieve better performance or superior profitability (Sadikoglu & Zehir, 2010).

The paper discussed the possible way of building the system of innovation capability indicators in Latvian context. National Innovative capability takes on an important role in the study of innovation as a capability means the resources an enterprise uses to create outcomes. In order to provide proposals for the system of innovation capability indicators, five principles were followed: the scientific principle; the practical principle; the principle of continuity; the principles for choice of indicators; the system approach.

It was concluded that there is no general best way of measuring the innovation capability. Innovation is a complex process. Individual indicators provide useful insights into the specific components. Together, they provide an understanding of the

linkages and the process by which knowledge assets are converted for commercial purposes. In fact, the most interesting lessons can be learned using a multitude of different approaches at the same time.

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