Impact of Qualitative Components on Economic Growth of Nations

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ABSTRACT
According to theory, innovative activity gives a chance to increase a competitiveness and economic growth of nation. The purpose of this paper is validation of that assumption using the latest data available for EU countries. Data set of indicators include: global innovation index, (GII), European Summary Innovative Index (SII), Ranking of Competitiveness of Nations (in a form of summary as well as subsidiary data) and set of macro economy data (GDP, labor productivity, export, export of high-tech, R&D expenditure as [as % of GDP] etc as measures of economic growth.
Various regression models: liner, curvilinear, planar or spatial with one or two dependent variables will be calculated and explained. In addition the appropriate 2 D and 3 D-graphs will be used and presented to strengthen verbal arguments and explanation.

The main result of this paper is relationship between innovative activity, competitive ability and growth measured as GDP per capita. Such relationship is shown as fairy good linear span of countries. Only two of them: Luxemburg and Norway due to higher than average growth value are outliers.

The valuable outcome of this paper is classification of nation into groups: highly innovative- highly competitive, highly competitive-non innovative, highly innovative- non competitive and non innovative – non competitive. The last group of nations fall into trap of low competitiveness.

Keywords: economic growth, social capital, institutions, innovative activity, R&D, competitiveness, knowledge.

1.Economic growth

Economic growth is understood as an increase of per capita Gross Domestic Product in an economy during a year. This is a synthetic measure supplemented by such symptomatic indicators as infrastructure or foreign trade (level, balance and structure) and extensive ones as innovation. GDP serving as the economic growth indicator is demonstrated in absolute terms and *per capita*, structural as well as dynamic as the growth rate.

Calculating GDP involves using the *system of national accounts* which assumes that each economic activity bringing profits to its legitimate accomplisher lays at the source of its creation. The legitimacy of business activity which forms GDP is essential for accepting it as the criterion. Until now GDP has not included the non commercial production and the underground economy (informal and unregistered business activity) [1]. Therefore, the GDP category is of an evaluative character only.

GDP, developed in 1930's is the best know measure of macroeconomic activity of nations. Its growth is a key indicator of effectiveness of given economy in short and medium term. It is based on clear and stable over time methodology allowing comparison of countries, regions in time. Unfortunately, GDP does not measure certain economic phenomena of gradually rising importance, i.e. the level of sustainable development and social exclusion. The necessity to improve the scope and the quality of information and the type of data essential to calculate GDP is generally accepted by economists and other practitioners. In 2007 The European Commission along with other organisations (The European Parliament, World Economic Forum, The Club of Rome, OECD) organised a meeting to discuss and propose improved indicators which would become globally approved and implemented in the near future.
The European Commission proposes an expansion of the *national accounts* method with environmental and social problems by 2012. Because of this literature proposes calculating the **Net Economic Welfare** (NEW). It enhances GDP with equivalence of free time, unregistered production, etc. and cuts it down by the value of external effects (costs of environmental pollution reducing the quality of life). In recent years it has been lower than GDP and this gap increases. It means that the pace of its growth is smaller. Its calculation is very demanding and also burdened with an estimation terror thus it is not widely used in practice.

This is compliant with The Europe 2020: A strategy for smart, sustainable and inclusive growth which is to replace The Lisbon Strategy. Realization of this strategy would require acceleration of present actions and creation of new ones in the following areas: innovation, management of resources, environmental policy, labour markets, counteracting poverty. This constitutes a great challenge for Central and East European Countries.

From the other side GDP shows the economic divergence between nations but does not explain why it occurs. Such divergences exist between various counties on different continents. Also in European Union one can find economies in which GDP per capita differs dramatically, from high in Technology Frontier Area –TFA (e.g. Finland, Sweden, Germany) to low in developing ones as Poland, Estonia, Bulgaria. In fact the spread in GDP per capita in Europe is dramatic as a results of political partition after world War II or North-South divergence.

It is commonly accepted by scholars and politicians shat GDP should grow in longer period, despite occurring cycles of economic situation. The economic literature has investigated the drivers of GDP, thus economic growth, for decades. There is a broad dispute and disagreement between scholars concerning the fundamentals of growth; of course there is a substantial agreement in several areas [2,3].

Fundamental components of economic growth in various theoretical models are divided into quantitative and qualitative.

The division of production factors in this way reflects divisions of economies into traditional and innovative based on R&D activity, knowledge formulation, education etc. Quantitative components are capital K and labor L. At the present among qualitative components we will find technology T, human capital H, institutions IN and economic policy of government P, combined in an equation

GDP=*F* (K,L;T,H, IN,P)

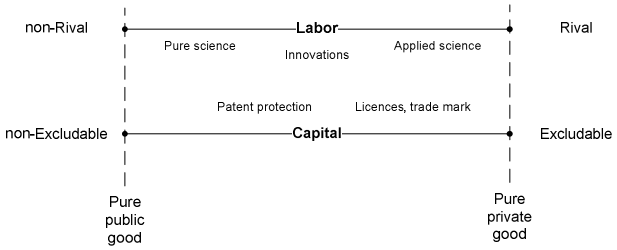
where F means functional relation. Another classifications of growth factors were provided e.g. from the time perspective [4]:

- direct short-term, i.e. work, capital and the technical-organisational progress,
- indirect medium-term (conditions for conducting a business activity and the socio-economic policy),
- indirect long-term (education, scientific and social knowledge, innovation, science, civilization and cultural level – mentality).

Differentiation between 'traditional' or 'quantitative' type of capital and qualitative (T, H, IN, P) could be explained in terms of rivalry and excludability following the paper by Kristian Uppenberg [5]. Fixed capital (K) and labor (L) are "…rival gods, which means that its use by one firm makes it impossible for other firms to use it at the same time. It is also excludable, since an owner of a piece of machinery can prevent other from using it".

By contrast "qualitative" components are typically not rival goods and not necessarily excludable but rather public goods. Non-rivalness means that using for example knowledge by one firm does not diminish the ability of other firm to use the same knowledge. Non-excludability means that one user of knowledge could not prevent other people or organizations from using it once it exists. Pure public goods and pure private goods are opposite points on continuous benchmark scale. In between one can find not pure public goods, partially rival goods or partly excludable goods. The position of some examples is shown in figure 1.

Figure 1. Differentiation between pure and private good



According to Gomułka [6], economic growth in TFA countries rely on R&D activity, knowledge creation, innovations, high quality HR which are various aspects of knowledge economy. At the some time the growth in developing countries to much extent depend on much more passive consumption of technology (diffusion). Thus growth of GDP is a function of capital and improving performance of labor caused by various components of technical (R&D, knowledge, innovation) and social nature (H, IN, P).

Components of social nature mentioned above consists of social / human capital, institutions and economic policy of the government. In this article some of them will be addressed breafly.

Human and social capital and technology all belong to the contemporary factors of economic growth. It shows the necessity of investing in the knowledge and skills sector [7]. Human capital refers to the stock of competences, knowledge, personal attributes, skills and health. It develops as the result of investments in education and health issues. It forms the foundations for broader understanding of the social capital concept. And the latter one is understood as an element of intellectual capital. Social capital is formed by informal institutions: standards and trust, social engagement networks, loyalty, ability to cooperate. It is formed and communicated by means of such cultural mechanisms as religion and traditions [1].

J. Coleman [8] and R. Putman [9] from the sociological point of view defined that social capital is formed by characteristic features of social life – social networks, standards and trust – which all facilitate cooperation and coordination of people's actions towards the common good. According to economists, social capital is a significant non-economic factor of economic processes as an instrument supporting them. It forms a collection of resources adherent to an individual through possession of more or less institutionalized relations of mutual recognition. Interpersonal trust, standards of mutuality, level of engagement, culture and related attributes of entities and societies all form foundations of these concepts.

The management paradigm based on social capital (including trust) is characteristic for the information society in its late stage of development [10]. Hence, the problem of institutions and social capital finds attention in literature mainly dedicated to the critical assessment of the political transformation period in states of Middle and Eastern Europe.

Therefore, investments in social capital play a significant role. Its shape depends on educational organisations, macroeconomic policy of a state and local government organisations. High level of social capital is characterized by sense of social identity, civic engagement, readiness for an active participation in local activity, intensive social communication, innovative entrepreneurial activities, openness for information and acquisition of new knowledge. The effects of social capital's reproduction translate to a tendency of entities for cooperation and formalized partnership. On the other hand, a low level of social capital restricts people's activity and increases a society's polarization of income while reducing prosperity as it leads to an increase of transaction costs, group conflicts and accumulation of social inequalities.

To summarize, it should be noted that the concept of social capital covers the informal social institutions which impose restriction upon behaviour of individuals and, therefore, cause an increase in management effectiveness. Their changes take place as the result of evolutionary processes as they remain deeply rooted in social consciousness. The level of social capital is a causative factor in cooperation between entities. Hence, it has been elaborated on in the book dedicated to business clusters [7].

Institutions

The concept of an institution in literature is understood ambiguously due to its interdisciplinary character. This term in common sense is used to describe an organisation, office, public department. Institutions are in fact the rules setting up principles of an economic game and related political interactions. But even Th. Veblen described the concept of an institution as referring to rules and organizations. Representatives of institutional economics believe that these institutions are in fact customs, habits and norms, traditions, attitudes, models of thought and behaviour. They are

categorised on the basis of the method of their formation as formal (market) and informal and they constitute foundations for interpersonal relations.

Therefore, the concept of an institution is capacious. Existence of a coherent, compatible system of formal and informal norms in a given state along with a high quality execution of the law causes an appearance of an institutional environment ensuring an effective market activity. It forms a non-economic framework for entities to make decisions regarding management. Therefore, an institution is a social concept deeply rooted in cultural and historical backgrounds derived from achievements of sociology and psychology and referring to an exchange and social costs of market coordination. The latter ones are lower if there are clearly set rules of the game and a system to obey them is in place, supported by social trust.

The new institutional economics represented by D.C. North [11], R. Coase [12] and O.E. Williamson [13] emphasizes that entities do not possess an entire knowledge regarding management conditions while the market structure fosters formation of the so called "frictions" due to its numerous imperfections. Hence its representatives point to the need to work out an optimal structure of stimuli for entities' cooperation (the role of a state) to stabilize markets and increase the rationality of business entities.

Institutions are characterized by slow evolution and inertia of the intergenerational exchange. This forms an obstacle in creating the system of market economy. It is generally accepted in literature that representatives of the new institutional economics deal with mesoeconomic and microeconomic problems which embrace both the cooperation (agreements, contracts) and coordination (norms) and their ties with favoured organisational forms. According to North institutions aim at decreasing the uncertainty present in interpersonal contacts [11]. According to him the informal institutions are of primary importance. Williamson takes a similar stand [13]. In turn, the formal institutions play a secondary role. But they are not always effective. To increase their efficiency it is necessary to create an elastic system of institutions which would adapt to technological, natural and cultural changes [14]. Institutions are restrictive in character and ,therefore, if they are good they reduce uncertainty, provide security, lower transaction costs and form a stimuli structure for people's actions, choices and entrepreneurial activities. Institutions are filled with motivations to invest in better technologies, development of skills and knowledge, and therefore, they mould economic growth.

Inclusion of institutions in empirical studies f economic growth remains extremely difficult. Many specialists highlight this fact. There exists, however, a necessity to overcome many methodological problems linked to statistical weaknesses, objectification of data and concepts. Institutional variables constitute soft features difficult for statistical portrayal. Their quality stems from the social context of values and cultural norms. The weakness of objectification of information about institutions is overcome by using statistical surveys among experts whose knowledge, however, remains subjective. Particularly the selection of variables to explain an institution's behaviour causes great controversy and numerous doubts. Moreover, the interpretation of their influence on economic growth remains ambiguous. Nevertheless, such economical institutions as ownership rights and transaction costs are considered to be crucial for economic growth. A. Sulejewicz [15] provided the synthesis of different researches and the critical analysis of their results.

Due to weaknesses in identification of institutional variables as the growth factors A. Sulejewicz states that "there can not exist a general or locally binding answer to the question about causes or factors" which determine the pace of economic growth in 27 EU states he analyzed [15]. He also believes that empirical studies disallow determination of coexistence of institutional causality. Moreover, by bringing up North's opinion he writes that although the rules are identical there are different mechanisms of their execution in different countries. He also concentrates on the role of economic policy in shaping economic growth. The aforementioned policy should most importantly foster completeness, stability, coherence and clear-cut nature of formal rules and also revealing their imperfections.

Improvement of empirical studies involving cocausality of institutions in economic growth may facilitate a broader explanation of processes behind economic growth dynamics in countries which underwent transformation, including Poland. The discussion involving this subject remains open.

Knowledge, as important factor of economic growth was pull out from " the shadow" by Robert Solow [16] and T. Swan [17] and used as starting point for modern empirical analysis of macroeconomic data and theoretical work. New knowledge is the output of investment in the form of spending on R&D, basic research, education etc. The similar relation exist between other investments, made by government and entities consisting of infrastructure, telecommunication, various networks, equipment etc. An investments tends increasing future growth. Unfortunately business investment rate dawn to 20,4 % in the euro area and 20,3 % in EU27 area in the fourth quarter of 2009 [18]. It is obvious (that devoting part of disposable resources to investments helps increasing future output e.g. economic growth. The problem arise for politicians how to divide those recourses between various types of competing investments. For example increasing stock of resources to knowledge creating activity will decrease amount of money in other areas (e.g. current consumption or medical care). For that reason it is difficult for many EU countries to increase expenditures on R&D to Lisbon target (3% GDP), or even EU average value (approx. 2% GDP) relying only on budgetary funds. Fortunately knowledge is not perfectly pure public good as being partly rival and/or partly excludable. In consequence, substantial stock of knowledge and R&D activity is generated by private business funds.

Table 1. Gross Domestic Product expenditure on R&D (GERD) by government sector in 2008 (% of GDP)

No.	Country	% GDP	No.	Country	% GDP
1	JP	15,6	8	Czech R.	41.3
2	Finland	21,8	9	Hungary	41.8
3	Belgium	22.2	10	Estonia	50.0
4	US	27.0	11	Bulgaria	56,7
5	Germany	27.7	12	Poland	59.8
6	EU27	33.5	13	Romanic	70.1
7	France	39.4			

Source: http://epp.eurostat.ec.europa.eu

There is a very big spread of data from 15,6% in Japan to more than 70% in Romania. In developing countries of EU the participatiuon of government in total expenditures on R&D is high (more than 40%). It means that share of business R&D is small, specially in Romania and Poland.

Easterly and Levine [19] argued that Total Factor Productivity (TFP) accounts for majority income differences across countries and not the capital and labor. (for example Taiwan, Ireland). It means that knowledge and innovations are factors increasing economic growth and differentiating

between countries. Differentiation results from flow or diffusion (spillover) of knowledge between countries (through the borders). The knowledge spillovers is important over time and depend on many factors. Among them one can mention international trade and foreign direct investment growing dramatically new. FDI disseminate knowledge, new technology, licences etc mostly from richer countries to poorer ones. However reach countries benefit more as they have more and better institutions and policies needed to benefit from knowledge dissemination. From the other side some pure countries are very smart in initiation of innovations, coping technology. Other important factor is human capital, even more important for developing countries [20] than investing in R&D and knowledge formation. Human capital is necessity for absorption of technology and innovation. The well known examples are Ireland and Finland. Years ego politicians decide to develop education at all levels for creation of highly skilled workers in modern branches of science and technology driven industries (ICT, electronics, mobile phones etc.)

There are in TFA different (various) partitions of capital and labor resources into traditional sectors (K and N, respectively) and innovative sectors (M and R, respectively) and innovative sectors (M and R, respectively). The total disposable capital is K+M and labor N+R. If M/K and R/N follow stable growth trajectory however in the period of 'technological revolution' those quotients are much higher. As a consequence growth quotient Y/L increases more dynamically and depends on share of investment in GDP. These quotients are high in TFA countries and promote technology flow towards developing countries. To conclude: the prosperity of nations depend mostly on qualitative components influencing quality of capital and labor and efficiency of their use.

There is no doubt that in many countries of market economy R&D is under-invested, specially in developing countries, national or regional authorities think about wider measures to support R&D of firms directly (by financial means, subsidies, research Programs) and indirectly. The examples are increasing the pool of qualified personnel, searching for talented people, ease immigration of high-skilled people, lowering entry barriers for new-firms, administrative costs, easing credits and venture –capital gains [21]. At the end however the question will be raised: what is the efficiency and effectiveness of public spending on R&D? It is very important issue, because "it is clear that direct and indirect public sector spending on R&D has a positive effect on private R&D spending and on the efficiency of private sector research personal [22]. Empirical research in this area indicated that there is a large potential for increasing efficiency [23]. One can mention the papers by Cincera [24] and Hollanders and Esser [25]. The relationship between inputs and outputs used to calculate Summary Innovation Index for EU countries shows efficiency border and distance of particular nation from this border. One interesting outcome is that some nations spending even less than 1% of GDP on R&D achieve relatively better results than rich due to spillover effects of R&D.

R&D is next factor of great importance for development and productivity growth [26]. The relationship between R&D and economic performance has been demonstrated in various studies. The general outcome is that:

1. return of R&D activity is higher then that of other capital sources.
2. riskness of R&D activity is relatively high,
3. R&D sector is underinvested [27]
4. R&D spending in many countries shows little variability over time (as part of GDP),

R&D activity of nations leads to the development and application of new technology, which in turn yield growth of productivity through: more efficient organization of production, better flexibility, increase of production, lean production, lean innovation etc. One should keep in mind, that radical innovations (product, organizational) will give profit with long lags. Consumers must learn and accept new product its utility, new functions and evaluate quality gains, which took some time. In case of radical organizational innovations, they must interrupt old habits and rules before adopting and learning new ones.

2. Innovative activity of nations (Summary Innovative Index)

> *An **innovation** is the implementation of a new or significantly improved product (good or service), or process, a new marketing method, or a new organizational method in business practices, workplace organization or external relations.*
>
> ***Innovation activities** are all scientific, technological, organizational, financial and commercial steps which actually, or are intended to, lead to the implementation of innovations. Some innovation activities are themselves innovative, others are not novel activities but are necessary for the implementation of innovations. Innovation activities also include R&D that is not directly related to the development of a specific innovation.*
>
> (Oslo Manual 2005)
> http://www.ttgv.org.tr/UserFiles/File/OSLO-EN.pdf

The main data source for calculating innovation of countries in Europe is Community Innovation Survey. Aggregated data are disseminated on the Eurostat webpage. The tables cover the basic information of the enterprise, product and process innovation, innovation activity and expenditure, effects of innovation, innovation co-operation, public funding of innovation, source of information for innovation patents, etc.

The European Innovation Scorebord –EIS is a list of countries based on their innovation performance across indicators. The number of indictors increase from more than 20 to 29 in 2009 ranking [28]. Indicators are grouped into five areas: innovative potential, knowledge creation and entrepreneurship (as potential for innovations) as well as applications and property rights as results. Groups of indicators are logically linked to innovative activity and follow the model of process with inputs (potential) and outputs (results) [7]. Innovation performance is calculated as number between 0 and 1. EU27 Member States fall into the following four groups: leaders, followers, moderate innovators and catching-up countries.

3. Competitive ability of nations

The term 'competitiveness' is not identical in meaning. Michael E. Porter in his "Competitive Advantage of Nations" [29] does not define at all what competitiveness is. Some sources explain competitiveness as ability of entity to compete and achieve success.

The "official" definition of OECD of a nation's competitiveness is "the degree to which a country can, under free and fair market conditions, produce goods and services which meet the test of international markets, while simultaneously maintaining and expanding the real incomes of

its people over the long term" [30]. Institute of Management Development use the following definition: 'Competitiveness of nations is a field of economic theory, which analyses the facts and policies that shape the ability of a nation to create and maintain an environment that sustains more value creation for its enterprises and more prosperity for its people' (IMD 2003).

Estimation of nations's competitiveness rely on simple or developed measures which reflect the overall results of management and ability of resource's transformation into competitive products and improving the quality of life in long period. Two groups of simple measures are in use. One group describes macroeconomic efficiency through e.g. GDP, rate of inflation or rate of unemployment. Another one deals with international trade through such measures as e.g. share of export in GDP, terms of trade, export structure, share of high-tech products in export, value of export per capita etc.

Unfortunately single measures does not reflect the level of competitive ability of nation. In the literature one can find opinion in favor and against multivariable models. Jeffrey Sachs and his colleagues argued in favor [31]. It is necessary to construct more complex measure composed of variety of simple measures, appropriate weighting factors and calculated according to statistical model. Variety of such holistic models are known in the literature, however two are of great applicability.

World Economic Forum developed 'Growth Competitiveness Index – GCI' on the ground of 12 pillars (institutions, infrastructure, macroeconomic stability, health and education, higher education, efficiency of market (products, labor, finance), adaptation of technology, market volume, management maturity and innovation. Resulting GCI is a rank for given nation.

The similar rank was developed by IMD (Lozanna). The World Competitiveness Yearbook published by IMD focuses on the outcome of the interaction of four competitiveness factors, which generally define a country's national environment. These are:

- Economic Performance (EP),
- Government Efficiency (GE),
- Business Efficiency (BE),
- Infrastructure (I)

On the basis of these four factors and more than 320 criteria (2/3 are hard data and 1/3 are opinion of 4000 managers), the WCY assumes that healthy performance in these dimensions creates a national environment that sustains World Competitiveness Index. The index is published once a year for 60 economies (51 countries and 9 regions). We use in our paper data on overall competitiveness (WCI) [32] of EU countries in 2008 and before the economic crisis. In addition we use data for four mentioned factors (EP, GE, BE and I).

4.Data and analysis

Variable set used as a proxy of economic growth, innovativeness and competitiveness of European Union and some additional countries. Most data are from 2008 sources but in some cases we use data from earlier periods. The analysis of time series for innovativeness and competitiveness indicates stability of ranks over last years. All data for growth are from 2008.

Growth is approximated by six indicators collected in table 2. Innovative activity for EU and some additional countries is measured by SII as a value from range 0-1. Competitiveness of nations is approximated by a set of variables developed by IMD as a rank. We used general rank CI and four group of ranks for economic performance, government efficiency, business efficiency and infrastructure. All categories: growth, innovative activity and competitiveness rare discussed in sections 1-3 respectively.

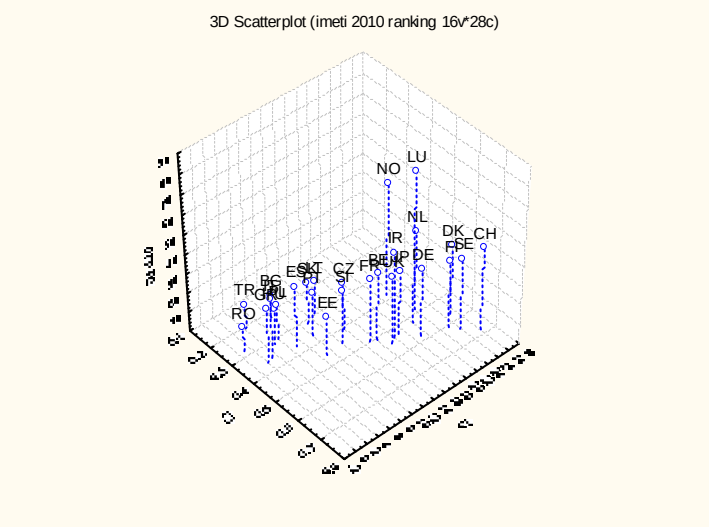
Table 2. Variable set used

Variable	Description	Value
Growth		
GDP pc	GDP per capita	in '000 USD
Exp/GDP	Share of export / GDP	% of GDP
Exp pc	Export per capita	in '000 USD
R&D G	Share of expenditures of government R&D	
R&D E	Employment in R&D	in %
EKIS	Employment in knowledge intensive services	in %
		in %
Innovativenes		
SII	Summary Innovative Index	0 - 1
Competitiveness		
CI	Competitiveness index (IMD)	Rank
EC	Economic performance	Rank
GE	Government efficiency	Rank
BE	Business efficiency	Rank
I	Infrastructure	Rank

For data analysis and presentation we used simple graphical presentation of relations in three dimensional space as previously [33].

The relationship between innovative activity, competitive ability and growth measured as GDP per capita is a main objective of this paper. Such relationship is show in figure 2 as fairy good span of countries. Only two of them: Luxemburg and Norway due to higher than average growth value are outliers.

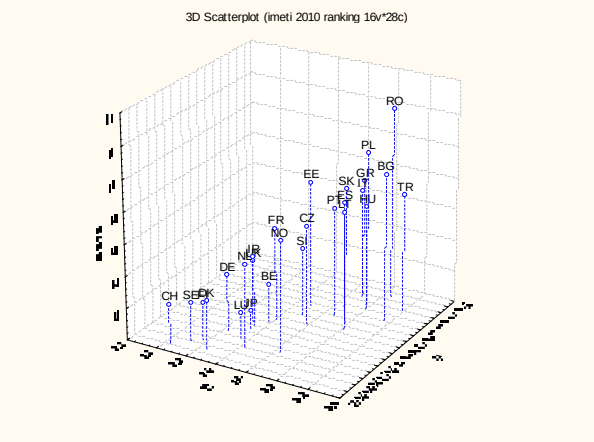
Figure 2. Scatterplot of Summary Innovative Index – Competitiveness – GDPpc



Another interesting plot is between SII-CI and research and development activity financed by government. The plot is presented on figure 3 as fairly good. The high share of government in total cost of R&D (in %) is reflected by high rank, with maximum for Romania. In developed countries the role of government in this type of activity is much weaker. Governments support mainly pure or even 'blue sky' research

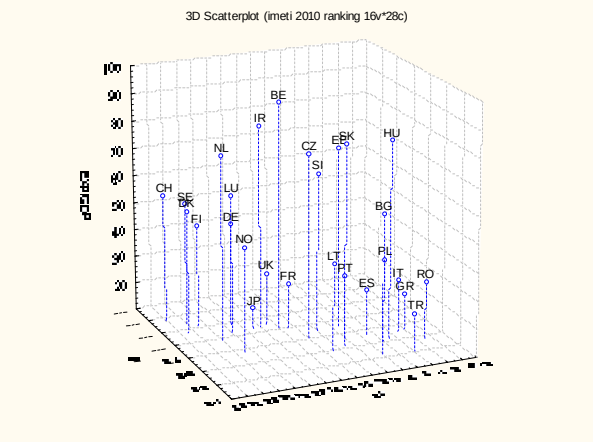
with a unknown probability of commercial application in future.

Figure 3. Scatterplot of Summary Innovative Index – Competitiveness and R&D G



The spatial distribution of points in the plot: innovative activity- competitive ability and share of export to GDP is shown in figure 4. It give impression of random distribution, however some group of countries could be seen. For example new EU members: Hungary, Czech Republic, Slovakia, Slovenia export a substantial part of their production. Some other countries like Poland, Romania, Latvia reach much worse results. In this same part of plot one can find however Italy, Spain, Portugal and Greece, know as 'PIGS' group, facing a great economic problems now. Remaining countries (highly competitive and highly innovative) differs also against export/GDP share. For example Belgium, Netherlands, Ireland leads, while UK a France are outliers.

Figure 4. Scatterplot of Summary Innovative Index – Competitiveness – Exp/GDP



Proof of such reasoning is given by Principal Component Analysis (PCA) of all data. Two principal components explain more than 77 % of total data variability. The projection of the components on the factor plane is shown in the figure 5A (upper part), while the figure 5B presents projection of countries. Superposition of both will lead to valuable conclusions. It is evident that new member states and some older from the South of Europe realize R&D activity mostly financed by government. Ireland, Belgium, Netherland are very efficient as exporting countries (Exp/GDP), while Greece, Portugal, Romania and even Italy not so much. France and UK are good in economic performance factor of competitiveness (EC). Denmark, Finland and Sweden owe their position to business efficiency (BE), high employment in R&D and in knowledge intensive services (EKIS).

Figure 5A. Projection of the variables on the factor plane

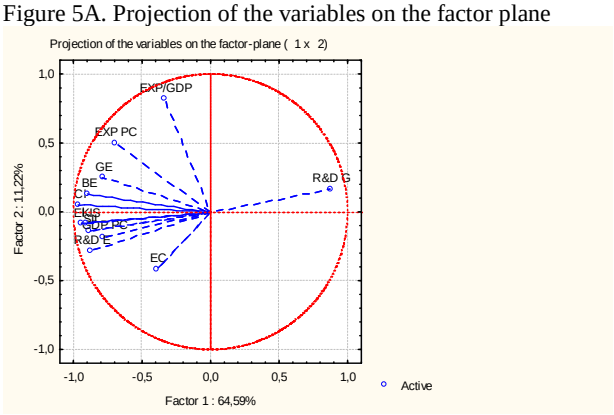
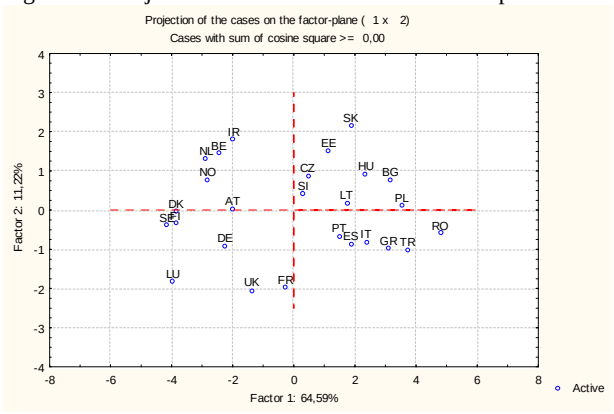


Figure 5B. Projection of the countries on the factor plane



The valuable outcome of this paper is classification of nations into four groups: highly innovative- highly competitive, highly competitive- non innovative, highly innovative- non competitive and non innovative – non competitive. The last group of nations fall into trap of low competitiveness.

5.Conclusions

According to theory, innovative activity gives a chance to increase a competitiveness and economic growth of nation. The aim of this paper was validation of that assumption using the latest data available for EU countries. The relationship of Summary Innovative Index – Competitiveness – GDPpc for EU countries is fairly linear with a moderate correlation and support the assumption. The matter is difficult for analysis due to the fact, that are no simple measures for those three dimensions. In fact to various extent all three parameters: SII, CI and GDP overlapped. The further analysis should take this fact into account. Also for better understanding the relations and new trends, the panel of countries must be expanded. Inclusion of Mainland Chaina, India, South Asia and South America economies is necessary.

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