

EU Knowledge Triangle: ‘Renaissance or Ocean of Papers?’

Petar Turcinovic

ABSTRACT

EU knowledge triangle composed of education, research and patents is being analyzed as a mean to improve quality of life in EU, including its economy and crisis resolution potential. While research side of triangle is satisfactory, education needs improvement in content and student and staff mobility. The number of patents should be higher given the number of research papers published. Obstacles to smartocracy approach are highlighted together with EU growth strategy 2020 with its supportive programs and other possible solutions to smart growth. Case studies are used to illustrate the need for flexible and timely support particularly in new IT business models. Bureaucracy, slow reactions, lack of success culture, and red tape together with conservative universities are limits to change based on creativity and smart growth. It was stated that EU strategy 2020 represents welcomed but slow move in good direction. Finally, return to basics of creativity, as an individual process, is being reinforced together with the idea of supporting inventors with the unemployed managers to help them with the implementation of inventions in the social phase of the patent process.

Keywords: Education, Research, Patent, Creativity, Invention.

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INTRODUCTION

The triangle of knowledge in modern society is composed of education, research and patents. A country aspiring to a good longtime standing in international arena should perform well in all three corners of this triangle. Governments, universities and firms together spend around \$1.4 trillion a year on R&D, more than ever before.¹ World trends in knowledge and new ideas creation demonstrate that EU has overtaken US in idea creation but is still lagging behind in patents and applied ideas. Asian countries are closing the gap rapidly and the world knowledge scene is witnessing an extremely competitive and interdependent race.² Recognizing that demographic trends in EU are weak, with economic crisis persisting longer than expected, a knowledge-based economy seems to be the only way to sustain good quality of life Europeans have enjoyed for decades and prevent a long term decline in economy.

What is the global economic outlook toward 2015? The global economy appears to be transitioning toward a more stable period. Although acute risks have diminished, real-

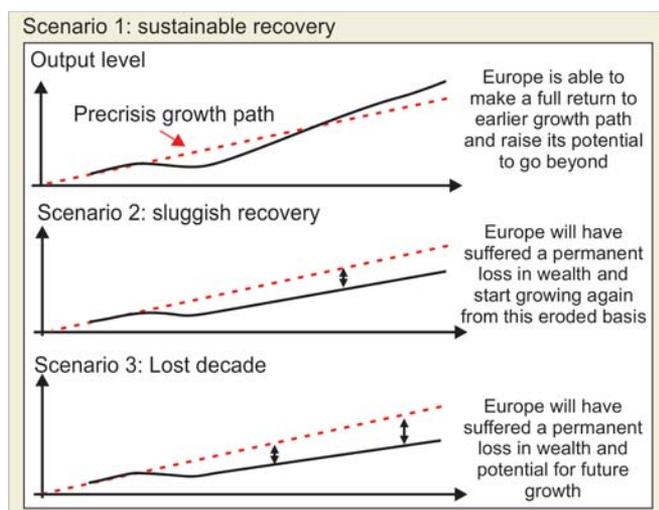
side activity remains sluggish—especially in high-income Europe. Most developing countries have fully recovered from the crisis. Although growth is slower than during the boom period, it is in line with underlying potential, and output is projected to pick up only gradually to around 5.8% by 2015. High unemployment and spare capacity remain pressing problems in developing Europe and the Middle East and North Africa.³

EU Exit from the Crisis was to be the Point of Entry into a New Economy

Confronted with three possible scenarios (Graph 1). EU leadership has responded with strategy 2020 in order to ensure smart, sustainable and inclusive growth. Smart growth—developing an economy based on knowledge and innovation. Sustainable growth—promoting a more resource efficient, greener and more competitive economy. Inclusive growth—fostering a high-employment economy delivering economic, social and territorial cohesion. These three priorities are supposed to be mutually reinforcing and they offer a vision of Europe’s social market economy for the 21st century. The strategy also includes seven ‘flagship initiatives’ providing a framework through which the EU and national authorities mutually reinforce their efforts in areas supporting the Europe 2020 priorities such as innovation, the digital economy, employment, youth, industrial policy, poverty and resource efficiency. The cornerstone of strategy 2020 is smart growth idea based on potential improvement of the triangle of knowledge components. Therefore, in order to assess the potential for success of EU strategy 2020 one has to take a closer look into smart growth composed of education, research and patent developments in EU together with its cultural, economic and managerial support mechanisms. How to put this in the simplified dilemma form?

Will the Bureaucracy or Smartocracy Flag Mark the Year 2020?

What will prevail—red tape, conservative financing, bureaucratic ocean of papers with little implementation or timely, unified, action oriented, flexible and mutually reinforcing behavior? The biggest danger for inventions is government states the Economist (2013).¹ Will the bureaucracy or smartocracy prevail? While it might take a



Graph 1: Three scenarios for Europe 2020 (From: Europe 2020—A strategy for smart, sustainable and inclusive growth. EC Brussels, 2010)

prophet to answer this question with certainty, we can look at circumstances, trends and challenges that favor one or the other outcome.

EU Education Trends

Last decade EU has witnessed various trends in education but many of them indicate weakness compared with outcomes and challenges ahead of EU. Education status and trends can give an indication about workforce that will enter EU job market. Their knowledge and skills might help or hinder 2020 goals. Eurostat⁴ data reveals some trends. The entry age in tertiary education is 19.5 years which is somewhat late if the economy is to have optimal fruits of their biological potential, particularly having in mind IT industry. At the same time the share of teachers in EU above the age of 50 is high which, having in mind the development speed in the same industry, might be considered too old. Only 10% of students are still in education at the age of 29 at the top levels of education, which seems to be too little for most complex jobs in science and for postdoctoral studies. The share of women studying math, science and technology has remained stable and low over the last decade; although the overall share of women in tertiary education has risen. Feminization goes by the field of science—in 2009 women accounted for more than 75% in education, training, health and welfare, 70% in humanities and arts and 60% in social sciences, business and law. Women dominate in tertiary education studies like in Croatia, Romania, Estonia and Italy where, e.g. more than 90% graduates in education and training were women. On the other hand men dominate in engineering like in Germany, Ireland, Austria and Netherlands where men accounted for more than 80% of graduates in engineering, manufacturing and construction. Some data show improvement like a decrease in teacher/

student ratio which fell from 16 pupils in 2000 per teacher to 14 in 2009.

Perhaps the most informative data linked with our inspection goal come from distribution of students in various sciences. EU needs quick reaction to catch up with countries already out of crisis in global economy. In this context students in natural sciences, engineering, manufacturing, construction, computing, agriculture might be in demand. The data shows, for the last decade, that the student distribution was not in their favor: for EU27—social science, business and law: 35.6%, health and welfare: 15.4%, engineering, manufacturing and construction: 12.9%, humanities and arts: 11.6%, education and training: 9.5%, science, mathematics and computing: 9.2%, services: 4.2%, agriculture and veterinary: 1.7%. If we calculate social/natural sciences ratio from these data (social 76% /natural 24%), it becomes obvious that the Society management students vs Nature management students ratio is 3:1, which is in discord with EU economic short-term tasks and goals. Situation is even worse if we take into account EU zone unemployment above 12%, with youth unemployment rising in some countries like Spain, Portugal and Greece over 50%. EU politicians are speaking of a 'lost generation problem,' but it seems it is better to accept managerial point of view and speak of unused potential and wasted resources. Why? In the heart of EU problems lies distrust of EU politicians and institutions reaching an all time high even in the traditionally pro-European France. Even the best EU crisis strategy is bound to fail if the majority of Europeans are not willing to act upon it. The EU society has trust and coordination problems obvious even to outsiders. Could Society management students (76% SMS) creatively help in mending EU society while 24% of Nature management students works on boosting exports? Can the large number of social students supported by many unemployed help in 2020 strategy implementation? Is it possible to foster social inventions on the same scale like physical patents? Can a 'surplus of social students' creatively contribute to EU orchestra sounding more in tune? If the answer is 'no' then EU is not only wasting its potential but the EU social system has to economically support the students. Even worse, social science professors have to rethink their potential to influence the society and educate students able to contribute to reshaping the society. Therefore, the question should be reformulated into a more workable one 'How can social and unemployed students contribute to EU 2020 or any other similar strategy to a greater degree?'

Research and Patents

An overview² of published articles in 2009 shows that EU is still a world leader in scientific articles published with

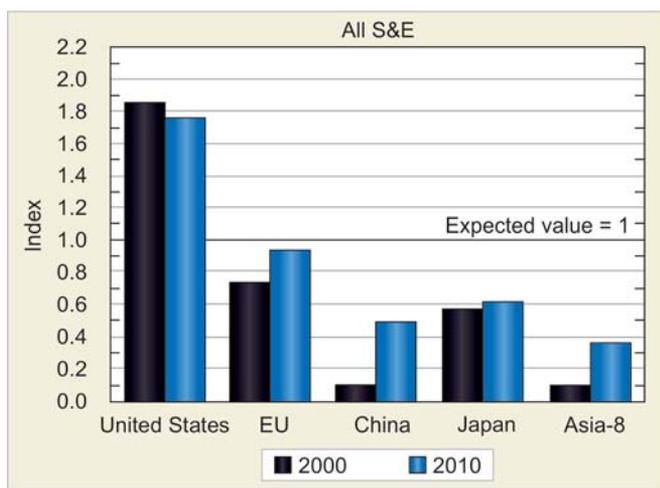
31% of total production followed by USA: 26.5%; China: 9.4%; Japan: 6.3% and South Korea: 2.8%. In EU data contribution of Croatia (0.1%) was also included. In the last decade Iran and China had fastest growth of 25% and 16% respectively – although from a low base, followed by Turkey and South Korea with 10%. EU had a growth of 1.4% while of USA of 1%. When it comes to citations, in 2010, USA was the leader with 36.4%, EU was on a second place with 32.8% and China was on third place with 6% followed by Japan 5.7%. This citation indicator, together with a well known fact that EU has been following USA in number of patents for years, clearly demonstrates that transfer speed, into patents and operational and economic value, of EU articles is still lagging behind USA effectiveness.

The same can be seen if we take a look at the world’s top 1% of cited articles in 2010 with USA as the leader with 1.7, followed by EU with 0.9 and China with 0.5. The change in the last decade has shown a slight decrease -0.1 in USA role with a modest increase for EU of 0.2 and a stronger increase of 0.4 for China (Graph 2). All these data point out to a need for greater efficiency and effectiveness of European research and patents and stronger orientation toward practicality and application of research papers. Nonetheless, EU research and patent position remains strong with a potential for boost through more co-operation among EU countries. There are many obstacles present, some of them being typical for EU – bureaucracy and untimely action. One example is EU patent law scheduled to be operational, by European Commission, next year when first EU patents should be issued instead of national ones. Inventors should not hold their breath because at present year 2015 seems more likely. This law has been in the making for decades. The rewards—in terms of growth inducing innovation—are worth the wait, but in a recession,

time is money. Bureaucratic procedure is coming to an end after the committee for the patent met on 20 March 2013 in Munich, the unified patent court to settle the issues will have their training, 13 countries missing will ratify it, power struggle over the location is over, and it has been agreed that EPO (European Patent Office) will administer the fees and distribute the income to member states. Minor social issues overwhelmed the central issue of effective and efficient united EU patent that saves the time and money for inventors and protects them more forcefully.

Innovation Needs Investment

But innovation is not just about an idea and technology. It is a process with strong financial aspect. The research by EVCA (European Venture Capital Association)⁵ shows that private equity involvement in a company results in patent citations going up by a quarter. EU venture capital in Europe lags behind the US. European countries, as a whole, see investment of €15 billion less a year in venture capital than does the US. Venture investments in the US represent 0.66% of gross domestic product (GDP) compared to the EU’s biggest investors—Sweden, at 0.06%, Denmark at 0.05%, and the UK at 0.04%. ‘We file as many patents in Europe as in the US,’ says James Burnham of the EVCA. ‘It’s not a problem of innovation; the challenge is financing it.’ That has been recognized by Michel Barnier, the European commissioner for the internal market in a speech in March 2013: ‘Better funding for smaller companies is key for Europe’s economy,’ He said it was ‘up to enterprising fund managers’ to seize the opportunities of new European funds for venture capital ‘as a matter of urgency’. The seeds of all sorts of ideas in business as diverse as health care and fashion are sown all the time. Many of them go on to make money and create employment and support the economy. Many do not, but that is all part of the process that is being helped now by new EU venture capital funds.



Graph 2: Index of highly cited articles: 2000-2010. Index represent country share of world top 1% of cited articles divided by its share of world articles for the cited year

Will this Fund Help New Inventors from App Business Model?

App is short for application for smart phone and represents a booming inventors business. The estimate is that it has produced over 500000 jobs in US in 2012. Mobile phone operating systems have given rise to a genuinely competitive apps market. EU is basically not participating in this apps game being developed too fast. What is so specific for this apps market is a worldwide niche market open for anyone with a computer and some programming skills? At this moment apps represent a world in which good ideas are the main currency and freedom of ideas resembles excitement great explorers had in a search of unknown. Why are bankers

confused? They met a young guy asking for capital presenting to them an app project with confusing vocabulary, but they are able to understand, after some questioning, that the product will be Freemium meaning it will be distributed for free. Offering intellectual property to the world free of charge is not an idea that fills the average European bank manager with confidence. EU banks cannot understand that you can make a lot of money for something that costs so little because they are used that one needs volume to make a decent return on investment. There are many good examples of apps business like language Babbel Company working now in over 190 countries with 10 million users or the app sensation Rovio entertainment, the Finish Company, with Angry Birds hit. The most educational is Nick D'Aloisio (17 years) case. He created an iPhone app called Summly, which summarizes news stories, and was shortly downloaded by nearly a million people and then sold to Yahoo for over 30 million dollars. The buyer explains why they bought Summly instead developing similar application of their own 'We work with some of the best scientists in the world – at the Stanford Research Institute but his technology has an 18-month head start'. The venture capital must make a decision fast and accept the risk – not typical for classic banking. In Summly case \$ 300,000 venture capital came from Li Ka Shing from Hong Kong (not from EU venture funds) in a mail that Nick D'Aloisio perceived at the beginning as a joke. This business model is specific and motivation for it is best explained by Nick 'One thing I'd like to do is angel investing in small companies. That's what's exciting, and if you are lucky to have a bit of money, you can take those risks. That's what I would do if I was going to go and spend it. If the motivation had been money, I'd be going off laughing. But because the motivation was technology and product, this is just the beginning of what I want to do'. Will the EU venture fond have the courage to match private capital for inventors like Nick D'Aloisio, speed to react before competition and paperwork that can be resolved in one or two e-mails? Without it (motivation) the fund will not stand a chance in apps business or some similar IT business as well. The Summly case represents typical smartocracy case with no state interference, private venture capital, inventors genuine motivation, risk acceptance and mutual trust of partners from different cultures and different age groups but-with genuine understanding of the product. It seems that state or EU bureaucracy wants a lot of paperwork in order to protect itself without a genuine understanding of the product/or instead of understanding the product. Unfortunately, EU apps startups are struggling not only because of conservative banking practice or lack of understanding the business model or fast changes and strong competition or red tape and

bureaucracy or an uphill climb in order to catch up with US apps results-but also because there is no culture of celebrating success stories which encourages others to do the same. How this can be done demonstrates. The Guardian with its step-by-step guide 'How to make your own high-tech fortune' published at a time Nick D'Aloisio made 30 million \$ deal with Yahoo. Apart from lack of stimulating culture there are obstacles in EU universities. European universities are still to nationally fragmented. Many national higher education systems have provincial outlooks. There is lack of competitions between universities and only more competition turns into more genuine co-operation in academia and business. Too much tradition and too little service to society, in the name of academic freedom, turns some departments into islands of personal power and closed groups. Too little demand for innovation hampers many universities, coupled with inadequate student and professor mobility, which all amounts to risk avoidance and safety seeking. Such educational system becomes slow in reactions to opportunity, and self-sufficient in constant search for 'do not disturb me' niche, with only occasional show of importance or competence. In the meantime, students with diplomas are piling up in EU unemployment services with business community demonstrating mismatch and minimal use for them.

Solutions can be Found on Social and Individual Level

One avenue leads to new universities idea. First, the time has come for more creative universities like Finland's Aalto University which does not want to be traditional university. It represents a radical rethink of education in Finland bringing together students of art, economics, technology and design. By stimulating interdisciplinary collaboration and removing traditional barriers, the university aims to provide the right environment for its students to innovate, think creatively and tackle challenges in new ways. Creating an entrepreneurial spirit and culture also forms an inherent element of Aalto University's research and teaching activities. Aalto is a great example of what can be achieved in education when the institution sets a goal to teach a mindset that is receptive to new ideas and provide an enabling environment to stimulate the development of entrepreneurial, creative and innovation skills. Another type of new universities is based on virtual nondiploma approach. Student who needs knowledge, skills, special techniques or just 'how to do something' will attend virtual courses. High motivation should be the only enrolment criteria. People like Nick D'Aloisio when they need programming skills might attend selected courses. Such a university would be based mainly on donor knowledge and basic digital site

EU support. Second, international universities represent new update to globalization. Universities should think global. They should use €400 million per year EU will make available to European universities to strengthen their collaboration with partners worldwide from January 2014. Every year 45% of the 4 million international students come to study in Europe. EC estimates are that by 2030 there will be altogether about 400 million higher education students and by 2020 there will be 7 million mobile students. More than 4000 EU institutions will compete for them with new innovative curricula, excellence in teaching and research and English as a working language. Other noninternational universities will need to develop international curricula, promote language and digital learning. EU will provide funding for 135,000 exchange students and staff between EU and world thus supporting international universities. DIU is such a university with a perspective to use Erasmus+ fund to support some of its students from the beginning of 2014. Third, free digital library of knowledge represents another addition to all citizens willing to learn and improve their skills and knowledge on their own.

Other solutions on social level include social support for innovation hubs and entrepreneurship, improving access to finance for research and innovation, increasing public procurement of innovation from SMEs, special programs like Innovation Union 2010, Horizon 2020, public support for creativity and innovation in order to boost self-reliance, initiative, creativity and experimentation of students. Red tape can be reduced for young and beginning innovators, particularly in IT sector, with the ‘rent a manager program’ or ‘rent a patent facilitator’. Unemployed young managers or lawyers can be educated to help inexperienced young inventors with business side of their invention or project. That way the inventor would concentrate more on the improvement of his invention while unemployed might get a job and sharpen her/his skills in real life arena. Public media should recognize success stories and thus support more risk taking by venture capital and more inventive attempts by individuals.

On individual level culture is important and more can be done in creative activities like storytelling, construction and building, creative cognitive games, integrating arts with IT activities, social games, and narratives of success, creativity competitions and case studies at all levels of formal and informal education. Inventions and creativity are individual processes often coming out of frustration like in Zuckerberg Facebook case or from curiosity like in D’Aloisio Summy case but they always include the courage to experiment with uncharted solutions and visit unexplored avenues. That is true also with scientists in high-tech labs and complex support systems although individual positions and support are more stable.

Europe is not there yet but is Slowly going in a Good Direction

The European Union is working to move decisively beyond the crisis and create the conditions for a more competitive economy with higher employment. The Europe 2020 strategy is about delivering growth that is: smart, through more effective investments in education, research and innovation; sustainable, thanks to a decisive move toward a low-carbon economy; and inclusive, with a strong emphasis on job creation and poverty reduction. The strategy is focused on five ambitious goals in the areas of employment, innovation, education, poverty reduction and climate/energy.⁶ Unlike the past the Europe 2020 strategy has a strong and effective system of economic governance that has been set up to co-ordinate policy actions between the EU and national levels to ensure that the Europe 2020 strategy delivers. Targets for 2020 are set clearly.

1. Employment (75% employment rate for women and men aged 20 to 64 by 2020—achieved by getting more people into work, especially women, the young, older and low-skilled people and legal migrants. The status in 2012 was 68.5%).
2. R&D (3% of the EU’s GDP to be invested in R&D. Combined public and private investment as well as better conditions for R&D and innovation. The status in 2012 was 2.03%).
3. Climate change. Energy sustainability, greenhouse gas emissions 20% (or even 30% if the conditions are right) lower than 1990 with 20% of energy from renewable, and 20% increase in energy efficiency.
4. Education. To reduce the rates of early school leaving below 10% and at least 40% of 30 to 34 years old completing third level education. The status in 2012 was 12.8% early leavers and 35.8% completing third level education.
5. Fighting poverty and social exclusion means at least 20 million fewer people in or at risk of poverty and social exclusion.

Three flagship initiatives help to achieve these goals especially in the education area. Digital market: creating a single digital market based on fast/ultrafast internet and interoperable applications: by 2013: broadband access for all by 2020: access for all to much higher internet speeds (30 Mbps or above) by 2020: 50% or more of European households with internet connections above 100 Mbps. Innovation union: refocusing R&D and innovation policy on major challenges for our society like climate change, energy and resource efficiency, health and demographic change, strengthening every link in the innovation chain, from ‘blue sky’ research to commercialization. Youth on the move: helping students and trainees study abroad,

equipping young people better for the job market, enhancing the performance/international attractiveness of Europe's universities, improving all levels of education and training (academic excellence, teaching, equal opportunities).

Dramatic rise in youth unemployment in some EU countries introduced new initiatives like 'Youth guarantee' program worth over 8 billion. Another important decision has been made by the Commission, member states and industry. They will invest more than €22 billion over the next 7 years in innovation. The investment will primarily go to special sectors via five public-private partnerships called joint technology initiatives.⁷

The results should be seen in stronger links between academia and industry that would help convert more innovative ideas and research into products and services that meet business and societal needs. Bridging the gap between excellent research and business creation should be visible by 2020 in the creation of more intangible assets. Intangible assets are nonfinancial, nonphysical assets. They are created overtime and through investment, and are identifiable as separate assets. They may add value to the company. Examples of intangible assets include training, software development, reputation and branding, research and development, the design of products and services or business process improvements. Intangible assets are increasingly recognized as playing an important role in the growth of developed economies, although their impact has been identified as difficult to quantify.⁸

All steps undertaken help to create context favorable to knowledge triangle but they also highlight the fundamental issue in knowledge creation and creativity. Creativity is an individual process and it cannot be imported from the outside although it can be stimulated by the context. Yet the inventions and ideas as a result of this process are social and represent advancement for a company and/or society. Thus, crucial is the link individual creativity-invention-product-market-buyers-improvement in efficiency and efficacy- better quality of life. It is easy to imagine many factors that can compromise this link and hamper the 'better quality of life outcome'. Clarity, precision, co-ordination and timing are crucial as well as knowledge about different phases of the process. The idea created needs multiple supports not only from its author but also from finance expert, organizational expert, branding expert, production expert, market expert, procurement expert and others which all amounts to joint venture and social engagement. To succeed, the orchestra must be conducted well, which makes its manager a crucial component, with a relationship expert on standby due to classical conflict between the inventor and the manager.

Creativity is sensitive, ideas intangible, implementation process complex and individual level questions that need

at least brief answers are: 'Why should we bother with such complex process and behavior when great majority of creative ideas die silently, most inventions remain on the drawing board, many patents never reach production stage and many products have only modest success?' On individual level, various measures of happiness have shown that people are happiest when they use their potential to a full extent (knowledge, creativity, physical attributes) and inventions represent an ideal self-realization case. On society level, triangle of knowledge represents the best and often the only way of development for advanced society not having enough natural resources or cheap labor to compete in international arena. Also, not to forget, we live in the era where common environment problems created by man can be solved only by creation, invention and joint action.

So we have to go humbly back to the basics at individual and society level and remember that creativity is based on playing with things and ideas. Society with time resistant and rigid education systems, red tape, oceans of paper rules, often helps us to grow out of creativity instead to grow into creativity. This sensitive bird called creativity should not be kept in cage but seduced from distance with patience and nice songs. Only then, happy inventor can tape her voice and sell it to the market, for other people to enjoy, business to make profit and state to prosper. Only then, smartocracy prevails.

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ABOUT THE AUTHOR

Petar Turcinovic

EU Institutions Department, Ministry of Foreign Affairs and European Integration, Trg NS Zrinskog 7-8, 10000 Zagreb, Croatia
Phone: 00385 91 2229222, e-mail: petar.turcinovic@mvep.hr