PUBLIC POLICY MAKING AND ANALYSIS
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УНИВЕРЗИТЕТ У НОВОМ САДУ
UNIVERSITY OF NOVI SAD

FACULTY OF SCIENCE AND MATHEMATICS 1969 NOVI SAD

GOVERNMENT OF THE REPUBLIC OF SERBIA
PUBLIC POLICY SECRETARIAT

PROCEEDINGS OF THE INTERNATIONAL (HYBRID) CONFERENCE "SCIENCE MEETS PUBLIC POLICIES" 11-12 APRIL, 2022 Novi Sad – SERBIA

THE BOOK OF ABSTRACTS

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Introduction

Today's society encounters big and complex challenges which policymakers must try to address. For example, the reaction to Covid pandemics across the world has shown the conflicting nature of policy problems and solutions. It is similar with other important global issues related to sustainable development, climate change, energy transition, food security and migration. Similar issues apply to more local problems faced by middle income countries like Serbia, such as high air pollution, low access to basic facilities including drinkable water and sanitation, depletion and suboptimal management of natural resources, depopulation, high poverty, low technology absorption etc. Policy problems are often complex due to opposed priority values of different groups in the society reflected in their different understanding of underlying policy goals (e.g. health or income in case of Covid related policy measures). To deal with these and similar societal challenges, policymakers need to use evidence obtained by scientists. In addition, policymakers from their side can even streamline the directions for research by suggesting the relevant priority research questions. Moreover, the technology and data availability has progressed to the extent that they offer new possibilities to solve some important policy problems. Big data, artificial intelligence, virtual reality can become a new tool to support policy analysis and design of novel policy solutions. Although the science-policy dialogue has been highlighted and put on high level by many developed countries, the level of dialogue is on more rudimentary level in the rest of the world. In Serbia, for example, very few policy decisions rely on ex-ante evaluation and scientific evidence. The most evident cases in recent period are related to sustainability issues, and have resulted in massive escalation and public mobilization. For example, the official decisions to issue permits to businesses for exploitation of natural resources faced controversy. In one case, this centered on building of mini hydropower plants, in another it was the construction of a lithium mine; both were strongly opposed by the scientific community, which brought evidence to the public, warning of the harmful effects on the environment.

Science and public administration have two very different cultures. Scientific research is produced in an academic environment with almost no hierarchy, and characteristics like creativity, innovation, and experimentation are highly valued. Researchers are motivated by desire to produce objective evidence and publish it after peer review process. Science uses formalized, often mathematized, abstract way of communicating findings including a reserve in terms of level of certainty. In contrast, politicians are driven to answer questions of public policy promptly. They are sensitive to public mood, and to often conflicting interests of different groups that they try to reconcile through acceptable solutions. These policymaking tasks are supported by civil servants, who operate in highly hierarchical environments and are primarily concerned about the legitimacy of decisions made through the official rules. Driven by this main concern, public administration develops a rather conservative culture, with low level of openness for innovation and flexibility while strongly relying on predefined procedures and regulations. Unlike scholars, civil servants are rarely specialized for specific narrow topics, as they are expected to deal with a large range of policy problems. The significant differences between these two cultures has recently been represented in a paradox manner in the sarcastic movie "Don't look up" which quickly gained global popularity.

In order to face societal issues which are often complex, sometimes described as wicked problems, the two worlds – science and policy – must approach to collaborate. Civil servants and politicians need to learn how to get, interpret and use the relevant scientific results. On the other hand, scientists need to understand the functioning of the state and the overall political dynamics around decision process linked to public policy, as a precondition for channeling their results and data in a way that could generate impacts on the society. A part of the solution is proper educational programs at all levels of education.

Faculty of Sciences of the University of Novi Sad has developed novel lifelong learning programs in public policy analysis under the Erasmus+ KA2 project for capacity building in higher education "Public policy making and analysis". These courses are delivered by the interdisciplinary team of university professors and civil servants working in the area of public policy from the Public policy secretariat of the Government of Serbia. They cover topics on policy making from both academic and practitioners' perspective. The curricula include topics such as policy cycle and related concepts, economics of public sector, policy evaluation and critical thinking, quantitative methods for public policy analysis, and public policy in the area of environment, agriculture and food. The courses are designed for different groups participating in policy process: civil servants, researchers, representatives of the civil society and business sector. The rich experience resulting from the delivery of the courses over the previous year brought valuable insights on the state and places for improvement of science-policy links in Serbia and in the region. The conference is intended to initiate the discussion and present the potential for science-policy dialogue. It should be used as a place for exchange of experiences and ideas on how to improve the outreach of knowledge produced by scientific community for better addressing public policy problems. This is the first conference of this kind in Serbia, offering unique perspective to the relevant knowledge and skills important for both policymakers and researchers.

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Program of the Conference

MONDAY, April 11, 2022

10:00–10:30 Opening remarks (Welcome address)

Jasna Atanasijević, president of the Scientific Committee, University of Novi Sad, Serbia
Milica Pavkov-Hrvojević, Dean of the Faculty of Sciences University of Novi Sad, Serbia
Sanja Mešanović, Deputy director of the Public Policy Secretariat of the Government of Serbia
Dejan Madić, Rector of the University of Novi Sad, Serbia

10:30–11:00 Keynote talk
How can we connect science and policy, David Mair, Joint Research Centre of the European Commission

11:00-11:15 Coffee break

11:15 – 11:45 Keynote talk
Evidence – based Policy Making: Promises and Pitfalls, Dimiter Toshkov, Leiden University, The Netherlands

11:45-13:00 Lunch break

13:00 - 14:00 SESSION 1: Sustainability topics – Climate and nature
Moderator: Dejan Vučetić, University of Niš

Environmental protection, public interest, academia and ecological activism, Ratko Ristić, University of Belgrade, Serbia

Hail suppression policy (un)making in Serbia: A case study of the science-policy nexus, Natalija Janc, Independent scholar, Belgrade, Serbia

Climate change – potential lessons from the past, Slobodan B. Marković, University of Novi Sad, Serbia and Serbia and Serbian Academy of Sciences and Arts, Belgrade, Serbia

Urban climate: bringing science and policy together in Serbia?, Dragan Milošević, University of Novi Sad, Serbia

14:00-14:15 Discussion

14:15-15:00 SESSION 2: Sustainability policy topics – Public health attitudes
Moderator: Dimiter Toshkov, Leiden University

Association of sugar intake and heart inflammation in young athletes
(A proposal for public health sugar reduction policy), Andreja Tepavčević, University of Novi Sad, Serbia

Vaccination policy and human rights, Aleksandar S. Mojašević, University of Niš, Serbia

Fact and Fiction in the (Dis)information Age: the Roots and Fruits of Our Ongoing Epistemic Crisis, Miloš Babić, San Diego, USA (online presentation)

15:00 – 15:15 Discussion

15:15 – 15:30 Coffee break

15:30 – 16:15 SESSION 3: Sustainability policy topics – Sustainable communities
Moderator: Zorana Lužanin, University of Novi Sad

Stakeholder integration and effectiveness of Territorial Spatial Planning during the Economic zones creation and Cluster activities, Case of Territorial Reform in Albania, Kriselda Sulcaj, Epoka University Tirana, Albania (online presentation)

Drivers of informality: main drivers and context specifics, Boris Najman, Université Paris-Est Créteil, France (online presentation)

Implications of the research in renewable energy investments for the regional policy – case of Poland, Joanna Rakowska, Warsaw University of Life Sciences – SGGW, Poland, Marta Barna, Lviv University of Trade and Economics, Ukraine (online presentation)

16:15 – 16:30 Discussion

16:30 – 17:15 SESSION 4: Sustainability policy topics – Environment protection technologies and policies
Moderator: Srđan Rončević, University of Novi Sad, Serbia

Shifting dreaded sediment paradigm: from waste to resource, Dragana Tomašević Pilipović, University of Novi Sad, Serbia

Analysis of the effects of the implementation of water pollution protection policy, Milena Bečelić-Tomin, University of Novi Sad, Serbia

Possibilities of solid waste reuse in wastewater treatment: Industry, science and policy symbiosis, Aleksandra Kulić Mandić, University of Novi Sad, Serbia

17:15 – 17:30 Discussion

17:30 – 17:45 Poster session

UV filters in aquatic environments – occurrence, legislation and photochemical behaviour during water treatment, Tajana Đurkić Simetić, University of Novi Sad, Serbia

Smart Cities an illusion or a reality: from Poland to Albania, Etleva Muça Dashi, Agricultural University of Tirana

Analysis of the Soil Erosion Intensity by using the WIntErO model: Land use changes of the River Basins of Kukulje, Montenegro, Branislav Dudić, Comenius University in Bratislava, Slovakia and Faculty of Economics and Engineering Management, Serbia

20:00 Conference dinner

TUESDAY, April 12, 2022

9:00- 9:30 Keynote talk
Politics of evidence based policy making reform: an insider's view, Jasna Atanasijević, University of Novi Sad, Serbia

9:30 – 9:45 Discussion

9:45 – 10:00 Coffee break

10:00 – 11:00 SESSION 5: Data for policy
Moderator: Nataša Krejić, University of Novi Sad

Gigmetar, an Instrument for Informing Policy: New Kind of Data for New Forms of Employment, Zoran Kalinić, Public Policy Research Center, Serbia and University of Kragujevac, Serbia

International studies' microdata as a neglected data source for public policymaking in Serbia, Srđan Verbić, Belgrade Metropolitan University, Serbia

Shadow economy estimation using cash demand approach: the case of Serbia, Marko Danon, National association for local economic development NALED

Unsupervised Machine Learning Techniques for Outlier Detection in Tax Databases, Miloš Savić, University of Novi Sad, Serbia

11:00 – 11:15 Discussion

11:15 – 11:30 Coffee break

11:30 – 12:30 SESSION 6: Education and science for public policy
Moderator: Andreja Tepavčević, University of Novi Sad

Critical thinking and public policies in education, Patricia Pol, Université Paris-Est Créteil, France (online presentation)

Science – Society relations: UNESCO global framework in a time determined by AI, Dobrivoje Lale Erić, The Center for the Promotion of Science (CPN), Serbia

Science and Politics as Vocations in the 21st Century, Sanja Petkovska, European policy center Belgrade, CEP

Societal Impact of Universities: the challenge of Lifelong Learning, Eric Hertzler, Université Paris-Est Créteil, France (online presentation)

12:30 – 12:45 Discussion

12:45 – 13:05 Presentation of the website "Policy Club" developed within the PPMA Erasmus+ project, Olivera Vuković, Lela Saković, SeConS Development Initiative Group-SeConS

Closing remarks 13:05 – 13:15

13:15 Conference cocktail
Location: Oranžerija Hall, Rectorate building 2nd floor, dr Zorana Đinđića 1 Novi Sad

Keynote talk

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Evidence-based Policymaking: Promises and Pitfalls

Dimiter Toshkov[1]

Evidence-based policymaking promises to transform the way governments conduct their business, from the design of policy interventions to the implementation of programs and strategies. Humans are subject to a long list of cognitive biases. Public organizations are myopic in their attention. Collective decisions are marred by pork-barrel politics. Government actions are guided by path dependency, short-termism and wishful thinking. Evidence-based policymaking comes to the rescue as it offers support to individual cognition and collective rationality, aids with setting priorities, and helps with choosing actions to achieve desired goals.

In the past decade, attention to evidence-based policymaking has grown considerably. It has been endorsed by bipartisan legislation in the US and by a host of government initiatives throughout Europe and beyond. Renewed interest in experiments (randomized controlled trials) and scientific advances related to causal inference and artificial intelligence have empowered the movement.

Despite high-profile political endorsements, however, progress in institutionalizing evidence-based policymaking has been uneven. Predictably, much of the resistance comes from entrenched bureaucratic interests and political considerations. But there are structural reasons for the uneven adoption of evidence-based policymaking practices as well. First, often evidence comes indecisive and does not univocally support one course of action over another, leading to questions about its relevance. Second, expert advice is easily politicized and discredited, as management of the COVID-19 pandemic demonstrated. Third, while evidence can inform policymaking alternatives, it cannot substitute for choices made by elected politicians, who have the formal authority and responsibility to act. Ultimately, to be successful, the evidence-based policymaking movement needs to be embedded in the democratic process of governance, to involve the public and gain legitimacy among citizens, as well as bureaucrats and politicians.

[1] Leiden University, The Netherlands

SESSION 1: Sustainability topics – Climate and nature

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Environmental protection, public interest, academia and ecological activism

Ratko Ristić[1]

Abstract

Responsible relationship towards the environment is one of the clearest indicators of understanding the concept of social justice and respect for the public interest, which sublimates the needs of the majority in the community. The attitude towards the environment in Serbia, during the period from 1990 to 2022, showed the weaknesses of certain legal solutions, administrative procedures, the work of government bodies and inspection services, excessive pressure on ecosystems, often against the interests of the local population. Serbia needs harmonious development that uncompromisingly protects the nature, improves the life quality of the population, and mitigates the effects of climate anomalies and achieves effective prevention of natural disasters.

Serbia is the poorest country in the Balkans regarding autochthonous surface water and forest ecosystems, with worrying levels of air, water and soil pollution. Development aimed at satisfying the lucrative interests of individuals and organized groups is a direct negation of the concept of social justice. Carelessness and tolerance of harmful activities lead to serious ecosystem disorders and environmental degradation, which is a manifestation of the inability of the system and wider community to perceive the self-destructiveness of this form of behavior. It is necessary to achieve an effective social agreement, based on a clearly defined public interest, through coordinated, complementary activities of state institutions, academia and citizens organizations.

Key words: public interest, environment, ecological activism, social justice

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Hail suppression policy (un)making in Serbia: A case study of the science-policy nexus

Milivoj B. Gavrilov[1], Natalija Janc[2], Slobodan B. Marković [1,3], Jasna Atanasijević [4]

Abstract

In this paper we present the case of hail prevention policy in Serbia over a 50 year since 1967 to present. We analyze the evolution of official hail prevention policy from the perspective of evidence-based policymaking and science – policy interaction, assuming that scientific evidence contributes to policy through problem definition, the appropriate design of measures and the evaluation of the policy impact of previously adopted measures and their implementation. The scientific evidence on the effectiveness of hail suppression using AgI rockets has radically changed over the observed period and hasled to a widespread abandonment of the use of anti-hail rockets in most countries. In Serbia, despite a change in mandates regarding hail suppression policy and measures as well as changes in the regulatory framework, there was no intention to use the new found opportunity of regulatory changes, including the adoption of a brand new law on hail suppression, to evaluate or reconsider main stream policy in line with research-based evidence focused on its effectiveness. We explore the elements of this detailed case study in an effort to identify the possible failures in policy making, i.e., the policy decision-making processes in government and parliament, and suggest some mechanisms to improve science communication with policymakers, concerning the specific case of Serbia, a country representative for most others in the Western Balkan region and potentially representative for other middle-income democracies.

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[2] Independent scholar, Belgrade, Serbia
[3] Serbian Academy of Sciences and Arts, Belgrade, Serbia
[4] Department of Mathematics and Informatics, Faculty of Sciences, University of Novi Sad, Novi Sad, Serbia

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Climate change – potential lessons from the past

Slobodan B. Marković[1], Milivoj B. Gavrilov[2], Natalija Janc[3], Quingzhen Hao[4]

Abstract

We are witnessing a developing, worldwide interest in the phenomenon of climate change, within both a notable portion of the scientific community and the public at large. This widespread interest in climate change implies the existence of a wide range of circulating perspectives on this problematic phenomenon, from underestimating its potential consequences, to interpretations excessively catastrophic in nature. Such an unprecedented global interest in understanding the mechanisms of climate dynamics is an understandable reaction, given modern civilization being undeniably dependent on the climate's stability and predictability.

Viewed from the perspective of long-term Cenozoic climate change, we are living in the last warm phase (interglacial) of the Quaternary Ice Age, which is still far cooler than the Paleocene-Eocene climate maximum. Many contemporary scientists have argued that an increase in greenhouse gas emissions released into the Earth's atmosphere will cause significant global warming. This study analyzes the variability of the Earth's climate over the last 65.5 million years, with a focus on greenhouse gases. It offers a possible basis for a more comprehensive critical assessment of contemporary attempts to foresee future climate change. Moreover, it offers some suggestions for policymakers regarding net-zero emissions goals, as well as other relevant policy reactions.

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[2] Physical Geography, Faculty of Sciences, University of Novi Sad, Novi Sad, Serbia
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Urban climate: bringing science and policy together in Serbia?

Dragan Milošević[1], Stevan Savić[1], Jelena Dunjić[1]

Abstract

Urban climate (UC) is an increasingly important scientific field that addresses the interactions between cities and the atmosphere. The "intensification" of UC research in recent decades has certainly been motivated by intensified urbanization and climate change that, for example, impact human health and comfort, air quality and energy consumption in cites. UC is therefore crucial to achieving several Sustainable Development Goals (SDG), such as climate action (SDG 13), sustainable cities and communities (SDG 11), good health and well-being (SDG 3), and industry, innovation and infrastructure (SDG 9).

The UC research in Serbia began in 2011 at the University of Novi Sad (Faculty of Sciences, Department of Geography, Tourism and Hotel Management - Novi Sad Urban Climate Research Team [NSUCRT]). Since then, NSUCRT members have been involved in numerous projects, research papers and teaching/training activities related to climate change and urbanization. However, it seems that UC issues often have a negligible impact on urban planning and design policies and there is no established link between UC scientists and public policy makers in Serbia. The main objective of this study is to question and review the possibilities of how to bring together UC scientists, urban planners and designers and public policy makers as an important step towards the development of climate-neutral, resilient and smart cities in Serbia.

[1] Faculty of Sciences, Department of Geography, Tourism and Hotel Management, University of Novi Sad, Novi Sad, Serbia

SESSION 2: Sustainability policy topics – Public health attitudes

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Association of sugar intake and heart inflammation in young athletes (A proposal for public health sugar reduction policy)

Zoran Šarčević[1], Zorana Lužanin[2], Andreja Tepavčević[3,4]

Abstract

As the most important risk factor for cardiovascular disease, controlling hypertension was historically a major focus of public health initiatives. However, the evidence begins to accumulate that not sodium but added sugar is related to hypertension and coronary heart disease.[1] High sugar intake has harmful effects on the cardiovascular system, especially in children[2]. American Heart Association in their Statement pointed out that it is reasonable to recommend that children consume ≤25 g (100 cal or ≈6 teaspoons) of added sugars per day and to avoid added sugars for children <2 years of age.[2]

This study aimed to check the association between sugar intake and factors related to inflammation of the heart in young athletes and to propose a public health program for sugar intake control.

The participants of the study were 96 young athletes aged 7-15, 34 female and 62 male that trained in various sports. ECG was done on all participants and analyzed for aspects that might be connected to inflammation of the hearth, that is the duration of the period from the peak of the T-wave to the end of the T-wave. Duration from the peak to the end of the T-wave is the transmural dispersion of repolarization and it is the time when ventricular cells are most vulnerable to early afterdepolarizations and ventricular arrhythmias[3].

The data on years of training and training intensity, type of sport, age, height, and weight were taken as well as information on sugar intake of the child per day. A minimum of 60g of concentrated sugar in sweets or drinks is taken as the limit.

The group of children that consume sugar, besides higher BMI, had on average significantly longer duration of the T-peak to T-end interval. The same results are obtained in male and female groups. This means that higher sugar intake is associated with longer T-peak to T-end interval in which there is a higher risk of arrhythmias.

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[2] Faculty of Sciences, University of Novi Sad, Novi Sad, Serbia
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[4] Faculty of Sciences, University of Novi Sad, Novi Sad, Serbia; Mathematical Institute of Serbian Academy of Sciences and Arts

The conclusion is that the benefit of playing sports cannot compensate for the harm of eating too much sugar, so an important public health target would be to lower sugar intake in children's diet (and in particular in the diet of young athletes).

Using the information on the habits of using sugar in the diet, it is necessary to determine interventions and activities that would affect the reduction of sugar intake from early childhood[4]. This suggests that the synchronization of public health and education policies could have positive effects.

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Fact and Fiction in the (Dis)information Age: the Roots and Fruits of Our Ongoing Epistemic Crisis

Miloš Babić[1],

Abstract

Ubiquitous Internet access and social networks have radically changed the dynamics of how information is disseminated in the modern society. It has never been this easy to access or share accurate information and expert analysis; and it has never been this easy for wild rumors and disinformation to reach audiences numbering in millions. Making the problem worse, many social media companies increase user engagement by employing algorithms that amplify false claims and potentiate the creation of (dis)information bubbles. Science communication has been affected as well, as the great boon of online publishing and free access became tainted by the rise of predatory journals and complexities in filtering bad data.

The COVID-19 pandemic has demonstrated the literal life-or-death importance of these processes, as rejection of scientific consensus and/or acceptance of social media gossip directly and drastically affected the death and disability tolls in various countries, or within certain cultures or subpopulations. The same mechanisms are slowing down our confrontation with other global threats (such as climate change, plastic pollution, or ocean ecosystem collapse); creating political instabilities; and are causally linked with increases in hate crimes, as well as intra- and international conflicts.

In circumstances where both the public and policymakers struggle to tell fact from fiction, creation and maintenance of effective fact-based public policies has become extraordinarily challenging. This paper will present some of the central mechanisms of this problem in more detail; explain why old, simple solutions to basic epistemological questions are no longer adequate; and explore some actionable protocols that can be utilized for better data evaluation and navigation of our complex reality.

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Vaccination policy and human rights

Aleksandar S. Mojašević[1], Dejan Vučetić[2], Jelena Vučković[3]

Abstract

The subject matter of this paper is the vaccination policy against KOVID-19 in the Republic of Serbia. The main goal is to examine the effectiveness of the current vaccination policy and to critically review the existing framework and organization for the implementation of this policy. The theoretical approach we follow in the critical analysis of vaccination policy belongs to the corpus of behavioral science (behavioral economics) and human rights. The starting theses are that the findings of behavioral science are not used at all or to a sufficient extent in the conception of vaccination policy and that the dichotomy between the right to life and the right to choose is resolved in favor of the latter. To test these hypotheses, we conducted an empirical study that examined, first, citizens' attitudes about whether they were vaccinated at all, as well as all predicted doses, and if not, what are the key reasons for hesitation or refusal to be vaccinated, but also their views on advantages and disadvantages of the current vaccination policy. In addition, we have put citizens in the role of "creator" of vaccination policy. For this purpose, an appropriate sample of respondents in the general population was formed, to whom a questionnaire specially created for the needs of the research was distributed. Based on theoretical insights of behavioral and human rights science, as well as the obtained empirical findings, concrete recommendations and guidelines have been formulated for the creators of vaccination policy in order to increase its effectiveness.

Keywords: vaccination policy, COVID-19, behavioral science, human rights.

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SESSION 3: Sustainability policy topics – Sustainable communities

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Stakeholder integration and effectiveness of Territorial Spatial Planning during the Economic zones creation and Cluster activities
Case of Territorial Reform in Albania

Kriselda Sulcaj Gura[1], Etleva Dashi[1]

Abstract

Planning process is composed of a set of factors and processes which do not act independently, and which are beyond the decision maker's control and when they come together form a network of interactions of social, economic, environmental, political, organizational, institutional elements resulting on spatial scale. Stakeholder integration in the planning process requires different methods on different phases and most importantly some preconditions to be successful. Taking into consideration the complexity and the importance of the process this work aims to analyze the stakeholder's integration in the territorial spatial planning reform in Albania. It makes a comparison between the level of integration in the planning and implementation phase and identifies the key challenges and dimensions phased in case of economic zones creation and cluster activities. A participatory approach and data reduction techniques were deployed taking into consideration of different stakeholders through a principal component analysis. The main finding is the main hindering factor which creates a handicap between planning and implantation of the reform is the large informal areas and the lack of ownership, and it concludes that full integration of stakeholders requires coordination of activities and practices of all actors in spatial planning; it requires trust and demands additional human and financial resources; involvement of different actors and the more representative indicators. We recommend a more effective collaboration, a better resource allocation and a preliminary capacity building and know how in the preparation phase of the territorial planning.

Key words: territorial spatial planning, stakeholder's integration, cluster activities, economic zones, cluster activities

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Drivers of informality: main drivers and context specific

Boris Najman[1], Yustyna Zanko[2]

"In developing countries, informal firms account for up to half of economic activity. They provide livelihood for billions of people. Yet their role in economic development remains controversial" La Porta & Shleifer, 2014

In this paper, we are presenting the informal economy main drivers, depending on their specific context. We propose a ranking of the main micro and macro drivers, based on country and regional contexts. This approach may provide a background research and policy tools for the researchers and policy makers in supporting countries towards formalization in line with the 204 recommendation of the international labour conference (12 June 2015). Effectively, it may be of important use to consider the lessons learned in research and policies; and for the data/surveys available. We have focused our analysis on the informal economy (IE) in the developing and emerging economies. Everywhere, even across different contexts, the existence of a significant IE is a major signal of weak governance and institutions. How fast the scale of IE development is mostly depends on the specific relation between IE drivers and their context. For example, wars and conflicts tend to create conditions for a large informal economy over a short period of time in countries already facing weak governance.

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Implications of the research in renewable energy investments for the regional policy – case of Poland

Joanna Rakowska[1], Marta Barna[2]

Abstract

Renewable energy plays a crucial and still growing role in meeting the urgent need of mitigating climate change, improving energy security and increasing social, economic and environmental benefits. Still in many different social and economic contexts it needs to be policy-driven and supported by public funds. The European Union addresses such public funds under the regional policy to eligible regions of its member states. All Polish regions have acquired the EU 2007-2013 and 2014-2020 regional policy funds and put renewable energy deployment among the goals co-financed from this source. Despite the wealth of research on the use and impact of EU regional policy funds on various aspects of socio-economic development at local and regional levels in Poland, the literature lacked a broader and holistic insight into who invested in solar renewable energy in Poland, what the regional as well as rural and urban differences in this field were and what they resulted from. To answer these questions several qualitative and quantitative analyses, including non-parametric tests and multiple regressions, were carried out. They were based on: (i) datasets of 1170 renewable energy projects under operational programs 2007–2013, (ii) datasets describing 2642 investments in renewable energy under operational programmes 2014-2020, (iii) data on social and economic characteristics of municipalities, (iv) the degree of urbanisation classification (DEGURBA) of Polish municipalities, (v) a survey of 252 local authorities. Findings showed that local governments contributed most to renewable energy deployment under operational programmes of the EU regional policy in Poland. They invested both in their own projects and they represented local households during the application process. However, due to financial constraints of local budgets and the scope of obligatory tasks that did not include renewable energy, local governments did not perceive it as the most urgent task. Solar investments prevailed. There were considerable regional differences in renewable energy investments, which were most numerous in northern, north eastern and eastern parts of Poland. The value of renewable energy investments did not depend on any of the social or economic factors included in the multiple regression models for urban and rural areas, which proved the necessity to look for other factors, possible human related, influencing the effects of the regional policy support for the deployment of renewable energy in Poland. Drawing up on the findings and discussion, it is recommended that the principles of co-financing should be evidence-based and should promote practices that are best in a given social, economic and environmental regional context. Thus, further research in this field should be carried out to extend the basis for multilevel decisions on the deployment of renewable energy on international, national, regional and local levels.

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SESSION 4: Sustainability policy topics – Environment protection technologies and policies

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Shifting dreaded sediment paradigm: from waste to resource

Dragana Tomašević Pilipović[1], Milena Bečelić Tomin[1], Đurđa Kerkez[1], Dejan Krčmar[1], Nataša Slijepčević[1], Jelena Beljin[1], Srđan Rončević[1]

Abstract

Dredging of sediment is defined differently by number of authors and states legislation. One of the definitions is by National Oceanic and Atmospheric Administration of USA as ”the removal of sediments and debris of lakes, rivers, harbours, and other water bodies..” necessary “because sedimentation – the natural process of sand and still washing downstream-gradually fills channel and harbours” but there are much more aspects that needs to be considered. Sediment dredging is often state- and species-specific, so policy must accommodate these distinctions to adequately protect the states resource.

Dredged sediments are recognized as part of the natural sediment cycle and therefore, the preferred management option is to retain dredged material within the same aquatic sedimentary system from where it originated. This approach is not always possible, especially within water body with contaminated sediment, as regulated by Serbian and European waste legislation. Therefore, an evaluation of the physical and chemical characteristics of the sediment to be dredged is necessary to determine potential dredging methods, beneficial use, disposal options and potential environmental impact.

Beneficial reuse initiatives have received significant attention as multiple sectors have recognized its value for diverse applications including, backfill material, soil remediation, and as fill for construction purposes. The ecosystem services provided by coastal habitats are diverse and considerable and have drawn recent additional attention to these threatened habitats for beneficial reuse investigation. Hundreds of thousands of cubic meters of sediment is dredged annually and, despite the evidence that the beneficial reuse of the dredged material can be used to successfully stabilize and restore coastal habitats, much of the dredged material remains underutilized. Recent extreme weather events have demonstrated the vulnerability of coastlines and the urgent need to protect them. Utilizing dredged material to enhance resilience in both natural and built systems is likely to become a pivotal part of proactive shoreline preservation and there are numerous opportunities for expansion and innovation.

Sediment reuse has logistical and economic costs and understanding how states can most effectively incorporate pro-beneficial reuse policy is increasingly urgent, as opportunities to protect invaluable coastal environments become more complicated and urgent due to continued degradation.

Shifting paradigm in dredged sediment reuse is necessary as each state faces unique challenges which are reflected in their policy approaches. The shared goal is balancing economic,

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environmental, and social interest, as well as the changing climate lend value and opportunity to cross evaluating the approaches of other states.

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Analysis of the effects of the implementation of water pollution protection policy

Vesna Pešić[1], Milena Bečelić-Tomin[1], Anita Leovac Maćerak[1], Dejan Krčmar[1], Djurdja Kerkez[1]

Abstract

Monitoring the implementation of public policies involves collecting and analyzing data during implementation, in order to determine whether the set goals are being achieved. The goal of water management includes the preservation and development of natural and created goods and the rational use of water and the creation of conditions for the realization of general interests, which includes protection of water quality, water quality management and control of water pollution. Water management policy should choose the way in which it will establish a link between pollution emissions and water quality in the observed watercourse. Water quality management and achieving appropriate efficiency in the control of emitted pollution is achieved by applying immission and emission quality standards. The aim of this paper was to analyze the effects of adopted regulations (public policies), so that they could be evaluated and reviewed. Until 2010, the legislation in the Republic of Serbia was based on immission standards (immission control based on systematic monitoring of surface water quality). This approach can only be adequate if all wastewater is effectively treated. Regulatory requirements for wastewater quality monitoring were based solely on physico-chemical parameters, neglecting the presence of potentially toxic substances. In 2010, a new Water Law was adopted, which prescribes integrated water management, and in 2011 the Regulation on Emission Limit Values of Pollutants in Water and Deadlines for Their Achievement was adopted, which begins to regulate the pollution emission control from point-sources. This paper compares selected indicators of water pollution and protection for the period 2000-2010. year and period 2010-2020. years on the territory of AP Vojvodina. For wastewaters, the number of constructed treatment plants and the amount of emitted load were analyzed, and for surface water analysis included the trend of nutrient concentration. Number of wastewater treatment plants in the period 2010-2020. year increased by 1% (primary treatment), 5% (secondary treatment) and 1% (tertiary treatment) compared to the period 2000-2010. years. The total amount of wastewater discharged on the territory of AP Vojvodina decreased by 34%, although the number of polluters increased. The total emitted load decreased for nearly 30% (for organic matter) and 25% (for nutrients). The Regulation on Emission Limit Values of Pollutants in Water and Deadlines for Their Achievement prescribes deadlines for reaching the limit values (by year 2025) and the current situation is such that only 50% or less of wastewater (depending on the observed parameter) is in line with the prescribed values. Only 5% of watercourses have a quality that corresponds to class II, ie. good water status. Observing the trend of nutrient concentration, it is decreasing in 80% of measuring points for nitrates, nitrites and orthophosphates, while it is increasing in 50% of measuring points in the case of ammonia

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nitrogen concentration. The state of surface water quality is probably a consequence of previous long-term pollution through the discharge of untreated wastewater. The results of the work may indicate whether the implementation of legislation can lead to the coherence of water protection policy and its objectives.

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Possibilities of solid waste reuse in wastewater treatment: Industry, science and policy symbiosis

Aleksandra Kulić Mandić[1], Milena Bečelić-Tomin[1], Gordana Pucar Milidrag[1], Anita Leovac Maćerak[1], Vesna Pešić[1], Đurđa Kerkez[1]

Abstract

The European Commission adopted legal framework for supporting transition to circular economy. Namely, the Green Agenda for the Western Balkans present main actions that focus on the climate action, circular economy, biodiversity, fighting pollution and sustainable food systems and rural areas. Among them, circular economy addresses waste, recycling, sustainable production, and efficient use of resources. In Serbia, waste management law has been amended to uphold new priorities in the management hierarchy, mainly the preparation of waste for reuse, which means returning products or parts of products that have become waste with minimal investment. Therefore, the concept of industrial symbiosis is emphasized – here waste of one industry becomes raw material for another.

In this work the connection of various industrial waste residuals is presented in the context of additional use as catalysts in the advanced wastewater treatment process. A literature review was conducted with the intention to give an overview of recent trends in scientific research as possible starting points for waste valorization. This work presents an efficient application of paper mill sludge and red mud, after modification, in the heterogeneous Fenton process. Namely, 96.7 and 90.1% of textile Reactive Blue 4 dye removal was achieved, respectively. Given the emphasis on the use of waste driven catalysts, their activity and stability should be targeted and monitored to ensure safe future use. Paper mill sludge had remarkable stability, only 2 ppb of Fe was leached into aqueous solution. Thus, providing additional use in symbiosis between industries that are dealing with large volumes of waste and industries with recalcitrant wastewater streams, such as textile industry.

Moreover, new policy trends and the fourth industrial revolution actuated the development of new business models and designs focused on a circularity. In Serbia, connection between scientific research and industry needs is necessary, especially in backing up residuals reuse and their added value. Public policies can drive those actions.

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Keywords: Industrial symbiosis, Waste, Residual, Modification, Fenton

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Poster session

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UV filters in aquatic environments – occurrence, legislation and photochemical behaviour during water treatment

Tajana Đurkić Simetić[1], Jelena Molnar Jazić[1], Jelena Vladić[2], Maja Vujić[1], Aleksandra Tubić[1], Jasmina Agbaba[1]

Abstract

During the last few decades climate change and ozone depletion events have been consequently causing a higher level of human exposure to ultraviolet (UV) light. UV filters attract significant concern as they are added to sunscreens and other personal care products in order to minimize and prevent harmful effects caused by the sun's UV radiation. UV filters are also commonly added to different industrial products such as pesticides, detergents, food packaging, rubbers, as well as paints and plastics. Based on the chemical structure, organic UV filters can be classified as para-amino benzoates, salicylates, cinnamates, benzophenones, dibenzoyl methanes and camphor derivates. European Union legislation (EU 2009; 2021) as well as Serbian national regulation (Official Gazette RS, 60/19) set the list of UV filters allowed in cosmetic products as maximum concentration of ready for use preparation. UV filters are considered as environmental contaminants of emerging concern (CECs) due to a numerous adverse toxicological effect for the environment and aquatic biota including the potential for endocrine system disruption, effects on reproduction and development and are currently not included in routine environmental monitoring at either EU or national level. These substances are not readily degradable and are able to resist wastewater treatment plants allowing them to enter into aquatic water bodies and accumulate in the environment. To better protect aquatic ecosystems and drinking water sources, advanced oxidation processes (AOPs) play a significant role to overcome the gaps and eliminate problematic CECs during the water treatment line. Our research showed that application of the photochemical UV/H_2O_2 and UV/$S_2O_8^{2-}$ AOPs leads to effective removal of 3-(4-methylbenzylidene)camphor (4-MBC) in water (> 90% degradation), due to oxidative attack of highly reactive free hydroxyl and sulfate radicals on the target compound. The obtained results indicate that 4-MBC was subjected to photoisomerization during the exposure to UV-C radiation (λ=253.7 nm; 30-2000 mJ/cm^2), whereby rapid inter-conversion between the (*E*)- and (*Z*)- isomers was observed, indicating that both isomers need to be monitored for the assessment of degradation efficiency. Obtained results suggest that innovative and novel AOPs present a promising strategy for the removal of UV filters from water, thus protecting aquatic environments and water supply sources.

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Smart Cities an ilusion or a reallity: from Poland to Albania

Etleva Muça (Dashi)[1] Iwona Pomianek[2]

Abstract

Technological solutions bringing together different policy fields help cities to reduce their environmental impact and offer citizens better lives. Smart Cities and Communities is supported through various EU instruments, such as European Structural and Investment Funds, Horizon 2020, and the European Innovation Partnership on Smart Cities and Communities (EIP-SCC). A smart city is a place where traditional networks and services are made more efficient with the use of digital and telecommunication technologies for the benefit of its inhabitants and business. A smart city goes beyond the use of information and communication technologies (ICT) for better resource use and fewer emissions. It means smarter urban transport networks, upgraded water supply, and waste disposal facilities, and more efficient ways to light and heat buildings. It also means a more interactive and responsive city administration, safer public spaces, and meeting the needs of an aging population.

Poland and Albania, through that countries, are laying in the distance of above 1000 km and in different climate zones, are attractive countries in terms of tourism, due to the occurrence of various natural and cultural assets. At the same time, these values in both countries are spatially diverse. Diversification concerns historical and environmental values but also the level of socio-economic development, infrastructure, etc.

The study aims to identify the tendencies and the diversities related to smart cities in the two countries. Due to the limited number of parameters (criteria) in the study, the assessment of the level of regional development in Albania and Poland was carried out using the SAW method by several indicators such as tourism, culture and leisure, healthcare, public spaces, and social welfare. Due to all these variables, we remarked that smart cities are strongly linked with smart conditions of living in both countries which consist in quantitative and qualitative changes taking place in a specific geographical area. All these effects are related to the necessity to complete the social needs and raise the standard of living of the society living in it.

Keywords: smart cities, urbanization, Albania, Poland, SAW.

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Analysis of the Soil Erosion Intensity by using the WIntErO model: Land use changes of the River Basins of Kukulje, Montenegro

Velibor Spalević[1],Branislav Dudić[2,3], Paolo Billi[4], Ronaldo Luiz Mincato[5]

Abstract

Land use changes extensively impacting soil erosion processes. The WIntErO model was used to evaluate the effect of land use changes on soil erosion intensity in the Mountainous Watersheds of North Montenegro, with comparing the impact of different land uses with the similar Geography, Elevations, Geology, Soils, Water Permeability and Meteorological characteristics, with its historic vegetation, current land use, and patterns of land-use change over the past decade (2020-2010). The land use data were interpreted from the Satellite images from Google maps in this study for the Kukulje region (Bijelo Polje Municipality, North Montenegro), and soil properties obtained from field sampling, laboratory tests, but also with using the data received from the field with interviewing the local farmers. The land use structure in the studied area was as following: (1) Plough-lands: 15.56% (2020), 11.88% (2010), decrease of 3.68%; (2) Orchards: 13.72% (2020), 14.85% increase coefficient -1.13%; (3) Mountain pastures: 6.91% (2020), 4.95% (2010), increase of 1.96; Meadows: 24.72% (2020), 21.78% (2010), decrease of 2.94%; Degraded forests: 25.41% (2020); 28.71% (2010), increase coefficient -3.3%; Well-constituted forests: 13.68% (2020); 17.82% (2010) increase coefficient -4.14%. For the current state of land use, calculated peak discharge for the Kukulje was 150.81 m^3s^{-1} (2020), previously 146.34 m^3s^{-1} (2010); and according to the calculations there is a possibility for large flood waves to appear in the studied basin. Real soil losses, G_{year}, were calculated at 1472 m^3 $year^{-1}$ (2020) and specific 250 $m^3km^{-2}year^{-1}$ (2020); on the other hand 1362 m^3year^{-1} (2010) and specific 232 $m^3km^{-2}year^{-1}$ (2010). A Z coefficient value of 0.488 (2020), 0.464 (2010), indicated that the river basin belongs to destruction category III. The strength of the erosion process was medium, and according to the erosion type, it was surface erosion. We concluded that the land use change in the studied river basin leads to changes in hydrologic response, soil erosion, and sediment dynamics characteristics with recording decreasing of the soil erosion intensity rates for 7% in the Kukulje Basin, Montenegro. Further studies should be focused on the detailed analysis of the land use changes trends for the available data for the periods of 2022 - 2019 - 2016 - 2013 - 2010 – 1985, but also, by using the same approach, with the neighboring river basins at the state level, with closely following responses of soil erosion to the changed land use structure. Field investigations validated our estimations and proved the applicability of this new computer-graphic method.

Keywords: Soil Erosion Intensity; Land use; WIntErO model, Montenegro.

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Keynote talk

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Politics of evidence based policy making reform: an insider's view

Jasna Atanasijević[1]

Abstract

A broad public administration reform in Serbia has been in place since 2014. One of its elements declared in the referent strategic document (Government of Serbia, 2014) consisted in reform of policy making i.e. planning and coordination of public policies and strengthening of evidence based policy making and the overall governance. This goal was operationalized through several specific measures one of which was setting up a methodological and procedural framework for design, adoption, monitoring and reporting on public policies in a form of the Law on planning system of the Republic of Serbia adopted by the Serbian parliament in 2018. The Law introduced for the first time the responsibility for results for public authorities in charge of public policy goals (the main responsibility so far reflected in concerns related to the financial audit and legitimacy for acting on any matter). The preparation of the law and building of the support for its adoption is analyzed through the positions of different stakeholders in terms of their motivation to support or oppose the introduction of new type of governance in public administration based on evidence based policy making. We argue that this reform is very challenging as the political power can be hardly motivated to strengthen its accountability by introducing evidence based policymaking and thus strengthening the governance mechanisms of its own activities. The latter is proven by the several failed attempts since 2001 to set the strategic planning and policy coordination function in the center of government. The specific motivation of the main stakeholders including prime minister and its cabinet notably minister of finance and minister of public administration, civil servants, EU, international development aid donors, consultants, international community including IFIs, civil sector including academia, is discussed. Moreover, it is shown that the understanding of stakeholders' landscape can be of a crucial importance for the successful framing and implementation of the reform of policy making in Serbia which enabled the evidence based policymaking as a systemic approach. Yet, we suggest that the extent of use of evidence in policy making is still limited as the capacity of both civil servants and broader public including researchers is determined by the relatively poor educational performance in terms of analytical skills, problem solving and critical thinking. It stands especially for the higher education in social sciences from where the majority of staff in public policy making is being recruited.

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SESSION 5: Data for Policy

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Gigmetar, an Instrument for Informing Policy: New Kind of Data for New Forms of Employment

Zoran Kalinic[12], Branka Anđelkovic[1], Vladan Ivanovic[1], Tanja Jakobi[1], Ljubivoje Radonjic[1]

Abstract

This paper draws attention to the lack of official statistical data related to the emerging phenomenon of platform (digital) work and new forms of employment (NFEs) in Serbia in general (Eurofound, 2020). This shortcoming makes platform (digital) workers[3] invisible to policy makers, which in turn leads to their fragile position when it comes to their labor and social rights. As an innovative business model, digital platforms play an important role in labour markets by facilitating the demand and supply of digital work. Because of the global nature of these platforms, digital workers often remain under the radar of national policy makers and regulators, as well as national statistical agencies. During the COVID-19 pandemic, this and other NFEs skyrocketed globally and in Serbia. Since the number of digital workers continues to grow at a steady rate, the government should formulate policies to support these workers and use their potential for the development of the national economy. Yet, this endeavor is almost impossible without the data about their number and characteristics, which the Republican Statistical Office will begin to collect as of 2025 (NSO, 2021). The paper, therefore, argues that novel data methods shall be used to ensure a timely institutional response to NFEs in Serbia, and consequently improve the socio-economic position of digital workers.

This paper presents Gigmetar, an instrument developed by the Public Policy Research Center (PPRC) aimed at monitoring the number, gender, incomes, and occupations of platform workers. Since December 2019, Gigmetar screens digital workers at the three most significant general digital platforms – Upwork, Freelancer, and Guru in Serbia and its neighboring countries: Romania, Hungary, Croatia, Bosnia and Herzegovina, Montenegro, Albania, North Macedonia, and Bulgaria, i.e. the region of Southeast Europe. Rare quantitative studies on online labour markets were based on small samples (Pesole et al., 2019; Brancati et al., 2018, etc.). On the contrary, Gigmetar is based on the analysis of massive data, representing approx. 80% of the total number of active digital workers on the observed platform. The data are collected by web scrapping of publicly available data at worker profiles on the selected platform. The developed instrument enables various analyses: regional distribution of digital workers within the country, distribution between genders, demanded hourly rates, or distribution of workers among six main groups of occupations (as classified by the Oxford's Online Labour Index (OLI)). Gigmetar can also be used for the analysis of national online labour market at one point of time; to compare digital labour force in different countries (by several characteristics); to monitor the development of the digital labour market in one country over time (since the measurements and analyses are done periodically). The obtained results can be used for defining new public

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[3] In this paper platform workers and digital workers are used as a synonym

policies in diverse areas: from those related to labour rights to those referring to the future of work, i.e., educational and training policies. The paper contributes to the growing body of literature aimed at reconciling the application of technology, big data, and policy making, the latest being the World Bank's World Development Report (2021).

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International studies' microdata as a neglected data source for public policymaking in Serbia

Srđan Verbić[1], Zorana Lužanin[2]

Abstract

Various international studies have begun to publish anonymized, individual-level survey results along with the study reports in the past decade. Previously, microdata collected in similar studies were treated as confidential and the only output was a report with statistically analyzed and aggregated data. Today, in addition to well-processed and analyzed results studies like OECD PISA or World Value Survey provide valuable raw data for the policy researchers. Gigabytes of microdata allow much deeper insight and linking these responses with background variables and other data sources.

Serbia has participated in more than ten such studies since 2015. Although, some of these datasets were announced as extraordinarily rich sources for policy reforms, they were not utilized. In this paper, we explore potentials of microdata obtained through international studies and reasons why policy researchers and policymakers still do not take advantage of this potential.

Common characteristics of all available microdata is well-defined and common methodology for all participating countries, released questions and scales as well as machine-readable response datasets. This material alone enables researchers to reproduce results and to perform some secondary analysis. Real value of available microdata comes through the linking of these datasets with other official sources of information. Registries and other huge administrative datasets that target whole population, not just a sample as surveys do, provide necessary background variables. That way linking data sources enables various cross-analyses.

In this paper we have also described challenges that data owners, officers in public administration and policy researchers face to use microdata efficiently. Typically, access to administrative data can be blocked by security issues, by outdated legislation and by confidentiality concerns. Technically, datasets linking requires availability of anonymized unique identifiers like unique student number or company identification number. These keys are not part of international studies datasets. They should be provided to researchers by registries of national or local administration. The reasons for unavailability of these keys are

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multiple, while the consequence is always the same – innovative policy research initiative stops because data from different sources cannot be linked together.

Lack of public policymaking based on microdata in Serbia is closely related to legal and technical difficulties, shortage of human capacity in the public sector and the absence of data-driven decision-making culture. Finally, we provide range of suggestions for improvements in this area.

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Shadow economy estimation using cash demand approach: the case of Serbia

Jasna Atanasijević[1], Marko Danon[2], Zorana Lužanin[3]

Abstract

Informalities in the Serbian economy seem to be relatively persistant and widespread, as suggested by some empirical evidence as well as by numerous anecdotal evidence provided by citizens and companies. Nevertheless, shadow – or informal – economy is a rather complicated phenomenon, with a complex set of causes and consequences, implying that there are no universally accepted definitions nor quantifiaction methods. This said, and to our best knowledge, the previous attempts at quantifying the scope of informal economy in Serbia were largely focused at some of its specific aspects, rather than taking an integral approach. Against this backdrop, this paper takes a pioneer attempt at using the ‘’monetary method’’ or the ‘’currency demand approach’’ for the Serbian economy, based on econometric estimates of the demand for money. In this context, we rely on the well known model developed by Tanzi (1983), by expanding and adjusting it for Serbia-specific context.

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Unsupervised Machine Learning Techniques for Outlier Detection in Tax Databases

Miloš Savić[1], Jasna Atanasijević[1], Dušan Jakovetić[1], Nataša Krejić[1]

Abstract

Tax evasion and tax avoidance possess serious challenges to tax authorities all around the world. The recent rapidly growing development of machine learning techniques and frameworks has opened many opportunities for automatic tax fraud detection. In this paper we review existing machine learning approaches to identify outliers in tax databases. Tax evasion cases can be automatically identified by training and deploying supervised outlier detection models. However, supervised models require labeled training data sets with a significant number of verified tax evasion cases. Such data sets are not always available since their formation requires extensive and long-term tax auditing with significant costs. Unsupervised outlier detection models overcome the previous strong requirements of having ground-truth labels in training data, but at the cost of lower precision and interpretability of results. Unsupervised outlier detection models are able to identify business entities with suspicious tax behavior. Thus, they can be deployed as decision support mechanisms enabling better prioritization of tax controls and more efficient collection of taxes. Our contribution to the field is a hybrid unsupervised outlier detection method for tax databases abbreviated as HUNOD. The main idea of HUNOD is to make a synergy of outlier detection approaches based on different machine learning designs in order to obtain a method that is able to internally validate outliers. To detect outliers HUNOD exploits clustering and representational learning techniques. A broad set of outliers is detected by K-means clustering that is additionally enhanced by relevant domain knowledge expressed by a feature weighting scheme. An autoencoder, a deep neural network learning latent data representations, is the second constituent component of hybrid outlier detection in HUNOD. The HUNOD autoencoder learns latent data representations of desirable tax behavior by training on a subset of business entities that are the most representative examples of compliant tax behavior. Such training entities are automatically selected by thresholding on a scoring indicator formed according to domain knowledge (e.g., the degree of tax burden of salaries). The set of outliers identified by the HUNOD autoencoder is then cross-checked against the broad set of outliers obtained by the K-means with feature ponders in order to provide the final set of internally-validated outliers. The interepretability of identified outliers is achieved by forming explainable-by-design surrogate decision tree models over internally validated outliers. Besides explaining why a concrete entity is an outlier in terms of feature values, those surrogate models additionally enable scoring of input features according to their power to discriminate outliers from non-outliers. The experimental evaluation of the proposed method is performed on two datasets formed from

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personal income tax declarations collected by the Tax Administration of Serbia. Additionally, the effectiveness of our hybrid approach is demonstrated by comparison to eight widely used non-hybrid outlier detection methods.

SESSION 6: Education and science for public policy

PUBLIC POLICY MAKING AND ANALYSIS
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Critical thinking and public policies in education

Patricia Pol[1]

Abstract

During the last twenty years, worldwide public policies for education and research have placed universities as the main drivers for the competitiveness of the so-called "economy of knowledge". Within this context, should academics and researchers, produce technical, specific, operational, useful and, in short, expert knowledge, as many university administrators and promoters of university research wish? Or should we rather defend a project of social emancipation through critical thinking? How can our students learn freedom of thought and how can academic freedom be enhanced? This communication will aim first at debating what place can be given to critical thinking in education in order to produce diverse knowledge and share it for the many. It will then discuss some strategies to learn our students to think critically.

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Science – Society relations: UNESCO global framework in a time determined by AI

Dobrivoje Lale Eric[1]

Abstract

Conceptually from 2010 and practically since 2014, the *Responsible Research and Innovation* policy (RRI) has been shaping European R&I environment during the period covered mostly by the Horizon 2020 programme. Novel framework – Horizon Europe – is looking (far) beyond existing scope, trying to create a functional symbiosis with the UN's *Sustainable Development Goals* policy (SDGs). Although core elements and key RRI values are already integrated, the question remains how to practically align Europe-oriented policy with a global system that has its own priorities and specificities. H2020 project *RRING* may offer insightful and relevant perspective, being conceived as a truly global endeavour with a goal to assess related policies and research practices under the umbrella of UNESCO *Recommendation on Science and Scientific Researchers*. The Recommendation was unanimously adopted in 2018 by the general council of UNESCO consisting of 193 member states. The Recommendation is an inspiring mechanism for bringing science closer to all citizens and establishing an independent and stable environment for the advancement of research processes.

First, quadrennial national reports of member states were due for submission in March 2021. Serbia's Report was created by the Working Group (WG) appointed in December 2020 by the Ministry of Education, Science and Technological Development. The WG was coordinated by the CPN team that provided technical and logistic support to the process through the project RRING. The WG was engaged in the collection, analysis and assessment of relevant data, materials and legal documents, as well as in drafting several versions of the Report. In the period of three months, WG had numerous virtual meetings, bilateral exchanges and discussions. The Report is divided into ten key (thematic) areas, as defined by UNESCO. Each area is addressed through relevant aspects from the perspective of the Republic of Serbia and its scientific environment, elaborating and respecting its legal and strategic framework, responsible institutions and organisations, adequate cases and examples, and its external influence, reach and dissemination.

Global, sovereign relevance currently possesses, however, an unprecedented super-technology. Artificial Intelligence (AI) undoubtedly colours our lives and increasingly impacts the environment we are in and the decisions we make. Thousands of researchers worldwide are engaged in its development and application, while guiding knowledge from highly heterogeneous disciplines and fields – cognitive and neurosciences, mathematics, linguistics, robotics, machine learning etc. – towards creating a new technological reality. With these aspirations and accelerated content hyper-production, many key questions and topics have been

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overlooked or abstracted, leaving their interpretation to a minority which is willing for a deeper, open and unrestrained dialogue.

On top of EU's determination to regulate and control the applicability and deployment of AI-based systems – *the AI Act* (still in a proposal phase), the general assembly of UNESCO recently adopted a ground-breaking *Recommendation on the Ethics of Artificial Intelligence*. *The Zaragoza Declaration*, created within the network of the European ARTificial Intelligence – AI Lab (Creative Europe project) in 2019, preceded this process and paved the way for further considerations in the field emphasising the need for social and environmental responsibility, traceability, transdisciplinary and humanistic conduct of research, etc.

AI needs a critical societal analysis and valorisation, and its values and meaning should be integrated into formal educational processes, however informal educative formats targeting all ages should be stimulated as well. It could even become a driving force of the STE(A)M integrative educational framework. Technological dominance undoubtedly increases the distance between different social strata, as AI finds its application first and foremost pleasing particular interests of large systems. In a world so heavily divided, witnessing a clear gap between technological advancements, societal challenges and global crises, we should try to provide uninterrupted bonds between science, policy and society at large, in order to inform and influence policy makers, use existing knowledge for a global prosperity and adequately prepare emerging generations for the world they're getting in.

Keywords: Responsible Research and Innovation (RRI), Recommendation on Science and Scientific Researchers (UNESCO), artificial intelligence (AI), RRING (Horizon 2020), AI Lab (Creative Europe), Center for the Promotion of Science (CPN)

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Societal Impact of Universities: the challenge of Lifelong Learning

Eric HERTZLER[1]

Abstract

While the economic impact of universities is well documented, their societal impact is subject to endless debate. As in many European countries, in French political debates many universities are often accused of existing in ivory towers, disconnected from external environment, particularly labor markets and, sometimes worse, accused as perpetrators of foreign values, manipulating young, student populations and endangering the national social contract. Globalization 4.0, ageing populations and the green transition are modifying the quantity and quality of jobs available. The recovery strategies adopted by European and national decision-makers during the current pandemic are accelerating transformations in our societies, and intensifying rapid and deep changes in labor markets. In response to these transitions, lifelong learning becomes an important societal challenge. Universities are positioned to become major actors in a market which remains dominated by multiple private sector interests, both national and international. This paper aims to examine, from a French perspective, the challenges to universities in an open, competitive environment during a time of crisis, to address lifelong learning societal needs.

The study of recent developments in the European higher education system (Erasmus + 2022 program, changes in national regulations, pressure of private international accreditations), and the literature review will serve to demonstrate how universities adjust to this particular societal challenge in a highly competitive environment. The experience within French public universities will be highlighted, as a case study, demonstrating a new trend.

The findings will emphasize the need to align university mission and values with the strategic plan, defining key measures of success as necessary condition to fully meet the objectives of engagement and positive societal impact. This cannot be achieved without considering the competitive environment, and the desire to articulate, the international, European and national requirements.

This paper aims to contribute to the general understanding of the changing missions, values and continuous quality assessment processes of public universities, in order to facilitate their position as important actors in lifelong learning in the global context. It will add to associated literature by exploring the underlying mechanisms of the social impact of universities by highlighting the French national example, and aims to lead to further comparative research.

Keywords: societal impact, university, lifelong learning, university mission

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Sciences and Politics as Vocations in the 21st Century

Sanja Petkovska[1]

Abstract

This paper aims to re-examine the dialogue between science and politics in light of the ideas given in the famous lectures given by the prominent sociologist Max Weber on the social meaning of science and politics as professions and their broader impact. As it is well known, Max Weber, in his lectures from 1917 at Munich University, has addressed the topic of two most important professions for the public and shaped the future debate on what is the service public servants should fulfil and values the practitioners should stick to to make the impact and success. We will mainly be considering one aspect of Weber's writings: the concept of diabolical powers and how it applies to the current conditions in academia and shapes the scholarship on policy issues. How the meaning of the two most prominent professions of public intellectuals was transformed and how the actual debate back then is reflected in current affairs. In his writings, Weber pointed out, especially to the ethical dimension of the two vocations the public is most considered with and the scientific justification of policy decisions and measures regarding their questionable value neutrality. The paper will seek to examine the meaning of evidence-based policy decision-making through the case studies to analyse how the problem of diabolical powers and paradoxical and unexpected outcomes of the political actions figures in current occurrences. Are the ideas presented by Weber still relatable for us, and to what extent do they inspire professionals for pursuing public policy of a higher quality and shape the debates in science-policy dialogue? These are the two main questions to which this paper will answer, which could be considered for the main results of the inquiry.

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