

PEER REVIEW OF THE UKRAINIAN RESEARCH & INNOVATION SYSTEM

PSF BACKGROUND REPORT UKRAINE

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Kick-off Meeting
European Commission
11 May 2016



technopolis_{|group|}



General Remarks

- ❑ **Ukraine is special and needs tailor-made suggestions and solutions**
 - ❑ **Ukraine is a lower middle-income transformation country with a rich scientific heritage from the Soviet Union and with a good standard of education**
 - ❑ **Unclear, if the economy transforms towards a knowledge based economy**
 - ❑ **Ukraine is comparatively still quite industrialised; at the same time it remained an agrarian society in rural areas**
 - ❑ **Ukraine is at war at Donbas region, confronted with an aggressive hostile superpower neighbour (e.g. annexation of Autonomous Republic of Crimea and Sevastopol)**
 - ❑ **GDP fell by -15% in 2015 compared to 2014; GDP/capita is below 2008 level**
 - ❑ **Political stability and effectiveness is limited (World Governance Indicators; Corruption Perception Index)**
 - ❑ **S&T, however, was shrinking already as of independence**
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Data Quality

- ❑ Relatively scarcity / limited accessibility to data, STI policy reports and analysis in English
 - ❑ Hardly any regional information
 - ❑ **International statistics depict evident differences**
 - ❑ No information about private non-profit R&D
 - ❑ **Systematic business R&D beyond operations of industrial research institutes is hardly present or statistically insufficiently recorded**
 - ❑ Strong differences in terms of R&D funding and R&D performance by BES
 - ❑ **Ukraine does not implement the Community Innovation Survey (CIS)**
 - ❑ Scarce data on venture financing
 - ❑ **Bibliometric data** to be interpreted with care because of the relatively low inclusion of Ukraine in international English-speaking publication circles
 - ❑ Data situation will improve due to **IUS/EIS inclusion of Ukraine**
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Observations on Innovation Policy

- 1) Private R&D funding increases slowly, but is still very low (< 20%)
 - 2) Business enterprise sector (BES) consumed 55% of GERD in 2013, but financed much less R&D
 - 3) Industrial research institutes are performing business oriented R&D – they are a heritage from Soviet system
 - 4) 16% of industrial enterprises engaged in R&D activities in 2014
 - 5) BERD is concentrated on (traditional) machine-building occupying lower market segments which face fierce competition from emerging economies – Russia was the main customer for machine-building products of Ukraine
 - 6) Ukraine's high- and medium-tech sectors shrunk threefold since 1990s
 - 7) Limited public support for innovation financing
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Technological innovation Priorities

- 1) Energy and energy-efficiency
 - 2) Transportation in a broad, but also peculiar fields (rocket and space; aircraft industries; ship-building; armament and military technologies)
 - 3) New materials with emphasis on nano-materials
 - 4) Agro-industrial technology-driven modernisation
 - 5) Bio-medicine (medical services and treatment devices, pharmaceuticals)
 - 6) Cleaner production and environmental protection
 - 7) ICT & robotics
- **No indication about broader understanding of innovation** (e.g. service innovation; business-model innovation; public sector innovation,; social innovation)



Technological readiness level is average

Ukraine's performance in the GCI based on the factor "technological readiness"	GCI 2012-2013: ranking and grade	GCI 2013-2014: ranking and grade	GCI 2014-2015: ranking and grade	GCI 2015-2016: ranking and grade
Technological readiness level (overall)	81 / 3,6	94 / 3,3	85 / 3,5	86 / 3,4
Availability of latest technologies	69 / 4,8	106 / 4,3	113 / 4,1	96 / 4,3
Firm-level technology absorption	80 / 4,8	100 / 4,3	100 / 4,2	100 / 4,2
FDI and technology transfer	109 / 4	131 / 3,6	127 / 3,7	117 / 3,8
Individuals using Internet, %	88 / 30,6	93 / 33,7	82 / 41,8	80 / 43,4
Fixed-broadband internet subscriptions per 100 inhabitants	69 / 7	71 / 8,1	68 / 8,8	72 / 8,4

source: WEF Global Competitiveness Reports 2012 to 2016; around 140 countries covered



Ease of doing business-ranking 2016

- ❑ Ukraine in “getting credit”: 19th of 189
- ❑ Ukraine in “starting a business”: 30th of 189
- ❑ Ukraine in “registering property”: 61st of 189
- ❑ Ukraine in “protecting minority investors”: 88th of 189
- ❑ Ukraine in “enforcing contracts”: 98th of 189
- ❑ Ukraine in “paying taxes”: 107th of 189
- ❑ Ukraine in “trading across borders”: 109th of 189





Recommendations of UNECE Review on Innovation

- 1) Regular evaluation of innovation system
- 2) Development of a holistic and concise national innovation strategy
- 3) Creation of National Innovation Council to improve system's governance
- 4) Provision of financial resources
- 5) Link business promotion with innovation promotion
- 6) Foster industry-science linkages
- 7) Engage private sector in public technology programmes through consultations and PPPs





Observation concerning the S&T system (1)

- 1) Periodic changes in S&T governance
 - e.g. no State Funds for Basic Research
 - No State Agency for Science, Innovation and Informatisation
but
 - National Council on Development of S&T
 - National Research Foundation
 - Recently amended law with focus on joint labs and start-ups
- 2) Post-Euromaidan governments (incl. MESU) show a strong readiness and **efforts for system reform – HORIZON 2020 association should be regarded as element in this**
- 3) Momentum of change – **are we part of this?!**





Observation concerning the S&T system (2)

- 1) 180 of around 1000 research and Higher Education institutions in Ukraine are directly subordinated to MESU
- 2) Other important players are
 - Ministry of Economy and Trade
 - Ministry of Finance
 - National Academy of Sciences of Ukraine (NASU)
 - Several other line ministries have R&D responsibilities**BUT LACK OF COORDINATION**
- 3) Regions seem to have a limited role
LACK OF COORDINATION BETWEEN NATIONAL AND REGIONAL GOVERNANCE

WE NEED TO TALK WITH MANY STAKEHOLDERS!





Observation concerning the S&T system (3)

In 2016 MESU wants to use state budget increases to R&D for

- Basic funding of R&D institutions
- Grants for nationally funded projects
- Research infrastructure
- Support schemes for young researchers (incl. diaspora return)
- Evaluation of state research institutions and universities
- Access to R&D databases (Scopus, WoS)
- Establishment of National Research Foundation of Ukraine





Observation concerning the S&T system (4)

- 1) Theory and practice of policy formulation and policy-delivery including follow-up are two different things – this also concerns R&D funding
- 2) Broad definition of R&D priorities correspond to the broad R&D landscape (at least on paper)
- 3) State-support is for state-owned/influenced institutions
- 4) Competitive project-based funding is very low
- 5) Most of state R&D budget goes to NASU – NASU's structure is currently under revision!
- 6) International R&D funding is high but dropped because of crisis (~20%)
- 7) Limited cooperation between public research institutes and HES
- 8) Low science-industry cooperation





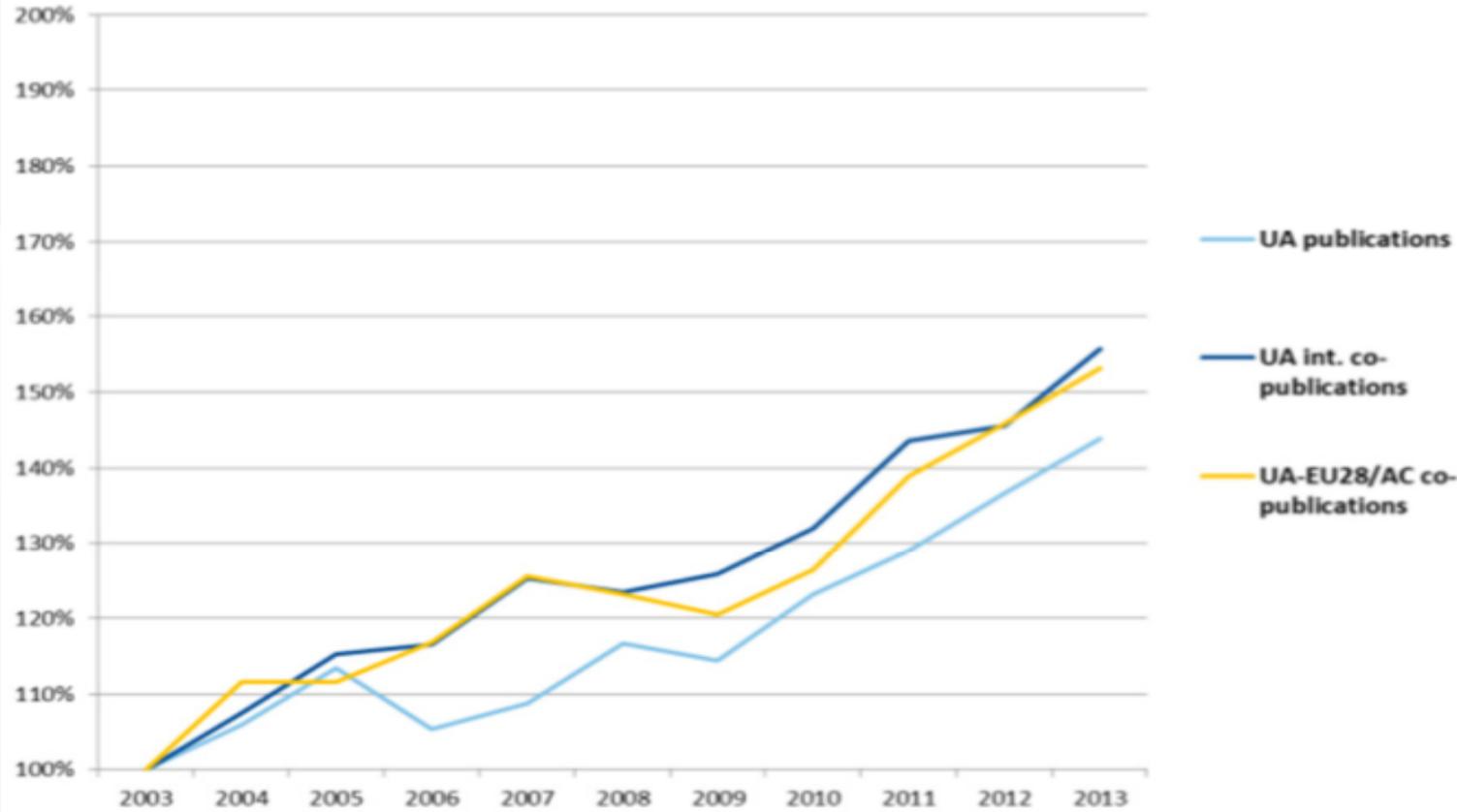
Research Quality

- ❑ **Research infrastructure facilities are overall outdated**
- ❑ **Low share and negative trend of Ukraine's most cited publications worldwide as % of total scientific publications of Ukraine**
- ❑ **Very low level of public-private publications by million population**
- ❑ **Rather low but steadily increasing level in international scientific co-publications per million population**
- ❑ **Low share of international co-publications in Ukraine (33.46%)**
- ❑ **Ukraine is considered specialised in physics and astronomy, material sciences and chemistry, engineering, mathematics and earth and planetary sciences**
- ❑ **Specialisation improves over time in mathematics, earth and planetary sciences, energy and economics, econometrics and finance**



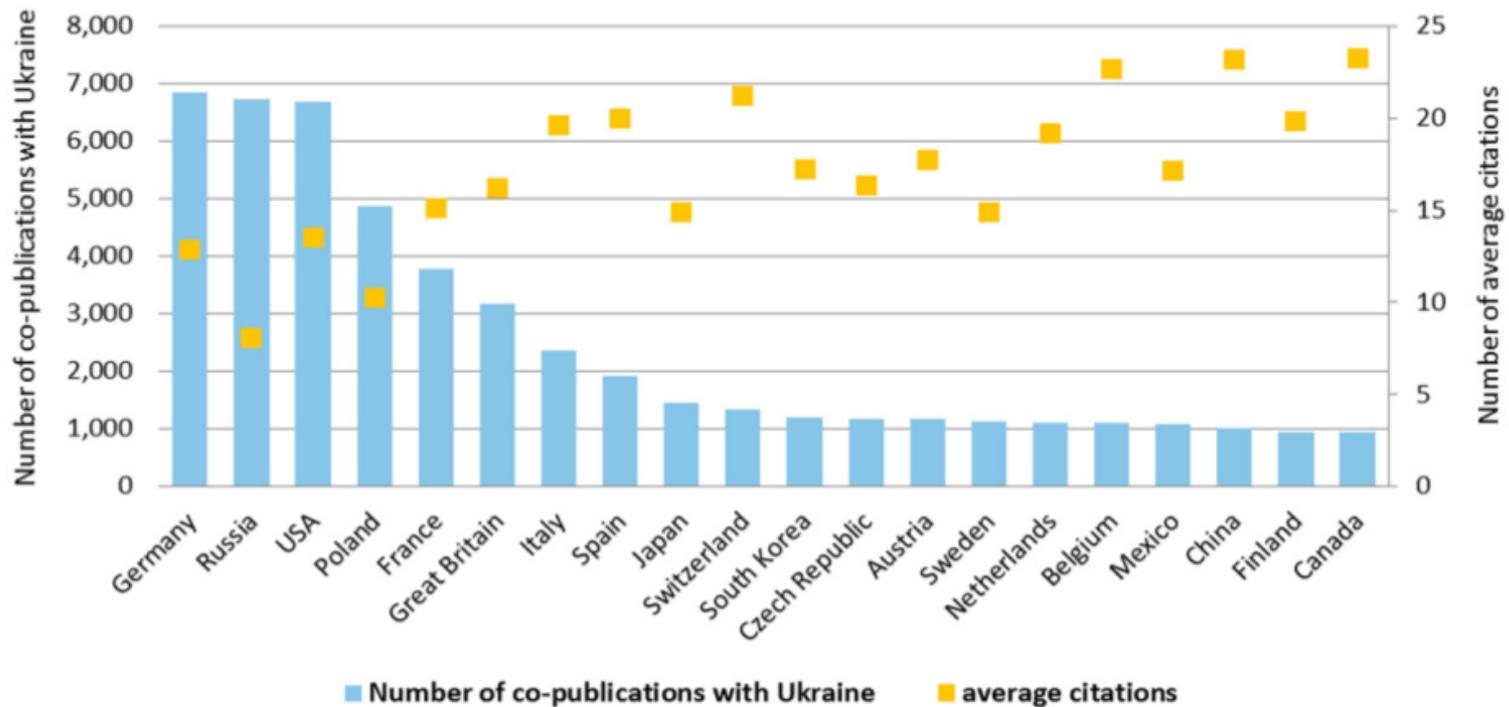


Research Quality – Growth rate of (co-)publications



International co-publication partners

20 most involved countries in Ukraine's international co-publications and their average citations 2003-2013





Higher Education System (HES)

- ~ 350 universities, but only half perform any kind of R&D
- Not all universities are subordinated to MESU (sometimes quality problems)
- Since 2005, Ukraine is member of the EHEA / Bologna Process
- New HE law introduces autonomy of universities
- Only a few are real seriously engaged in R&D (HERD was less than 7% of GERD in 2011)
- 70% of HERD comes from state and regional budgets
- HES is mainly absorbing scientifically educated personnel (70%); but mainly for teaching - 2.5m students enrolled





Human Resources

- **Ukraine inherited a relatively well-developed education system**
- Ukraine has a **high public spending on education** (incl. tertiary education), but (vocational) schools are lacking technical equipment
- Teaching approaches are old-fashioned
- Several incidents of **corruption in the education system at all levels**
- **Very high university enrolment (80% of 19-25 year-olds), but low PhD enrolment** indicating low interest to pursue scientific careers
- Also **high level of tertiary education attainment, but absorption capacity of the Ukrainian economy is limited**
- Ukraine belongs to the countries with highest share of over-qualification
- Students shift from natural sciences and technical sciences towards humanities, social sciences, business and law





Doctoral training and labour market for research

- Of the growing number of scientifically trained personnel only 20% are involved in R&D as primary job task
 - Doctoral training lags behind transformation of other level of higher educ.
 - New positions are few and number of researchers is constantly declining (around the level of Austria)
 - Large number of scientists are at pensionable age in Ukraine
 - Researchers in BES / million inhabitants is low
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Internationalisation

- ❑ Association to HORIZON 2020 on 20 March 2015
 - ❑ Relatively good participation in FP7 (€30.9m) with good success rate (~ 20%)
 - ❑ Participation in HORIZON 2020 did not improve (success rate of ~13%)
 - ❑ Highest success rates in EURATOM; lowest in ‘industrial leadership’
 - ❑ 25 intergovernmental S&T agreements with EU MS and AC (2014)
 - ❑ NASU has 110 bilateral agreements (most projects with Poland, France, Hungary, Slovak Republic and Czech Republic)
 - ❑ Nationally filed patents abroad are mostly in Russia, and with distance in USA, South Korea and Poland
 - ❑ Few patents are recognised in EU and USA indicating a weak integration of Ukrainian companies in global value chains
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