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Accounting for Complexity in Strategic Impact Assessment

-for comments only -

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Abstract: There is an apparent paradigm crisis in the strategic impact assessment (SIA) reflecting in a disagreement over assumptions about the aggregation of numerous policy impacts (micro level) into summary conclusions (macro) that are proposed to the decision-makers (operating at meso level). A new generation of SIA is needed to cope with social complexity when social values are incommensurable in scale and scope (economic, social, human, natural). Here is proposed a meso-matrical impact assessment (MIA) that is based on Leontief's quadratic input-output matrix which explains scope dimension of social incommensurability on the meso level. With this focus of the assessment considerably deepens. Now MIA involves not only description of the policy effectiveness (achievement of sectoral goals with sectoral instruments), which is only its first step, but also relational and correlational aspect between social incommensurabilities (demonstrating achievement of integral social vision with given governance approach). Two practical examples confirm advantages of MIA for the complex assessment of the strategic policy interventions compared with the prevailing simplistic approaches.

Introduction

Many of those involved in the strategic assessment of government interventions' contribution to the social welfare have had significant difficulties in summarizing known facts into summary findings. There are incommensurable viewpoints with regard to many social realities, which provide us with very different 'numeraires' (Funtowicz, Ravetz in Martinez-Alier et al) and macro-views of the world which are not reducible to common denominator. In a complex world, trade-offs between intrinsic sustainable values are unavoidable (Weaver, Rotmans). On the other side, handling trade-offs in policy-making is not always ensuring consistency across different domains. Progress has reached a stage where the juxtaposition of opposite logics in government interventions that ignore each other can no longer continue without crystallising tensions with detrimental effects on overall system evolution (ESPON). Tomer (in Svendsen) has referred to this malfunction as "mainstream theory's most notable failure".

This recalls a standard social choice problem. Arrow has explained with impossibility theorem that once democracy and the Pareto maximum efficiency criterion are agreed upon as indispensable at the micro-level, full collective rationality cannot be attained at the macro-level. He proved that it was impossible to scale up from all individual preference functions to produce a "public interest" function that satisfied desirable properties of an aggregation process (Evans et al). By the same token, Coleman (1986 in Åberg) maintains this micro-to-macro link, also referred to as social causation (Sawyer), is controversial and the most poorly developed part of sociological theory. The non-existence of a social welfare optimum is a very troubling result, because wider consensus about collective goals ceases to have any practical relevance (Schnellenbach) for policy-making.

Incommensurable theories of the individual and the collective mirror conflict between private and public matters. The proponents of classical economic doctrine, Smith, Ricardo and Malthus worked with aggregate magnitudes on a large scale and uniform scope, and they proposed considering the

activities of individuals as having no role to play in this objective machinery, being at best epiphenomena, "explained by, but not explaining, the aggregate relationships" (Dopfer). In contrast, neoclassical economists such as Walras, Jevons, and Pareto, composed a uniform micro-view by acknowledging that a proper theoretical account of the functioning of economic and social systems was inconceivable on the basis of objective laws (Dopfer).

Neither of the opposing views avoids a reduced examination of a social complexity. A disadvantage of the aggregate view of the 'entire' macro reality as one homogeneous phenomenon is the lack of structure and heterogeneity due to the uniform treatment of micro-events which is known in evaluation studies as the 'macro-bias' (Elzen in Schenk). On the other hand, a disadvantage of the micro-view is that its conclusions are based on extrapolations from non-representative individual cases. As a result of uncertainty at the micro level, bottom-up assessment tends to widely 'over-forecast' or 'under-forecast' at the top-level (Kahn in Schenk); therefore, it is also unable to assess changes in the whole system. Different synthesis proposals for direct linking micro and macro (economic) theory have been proposed in last 50 years (Mankiw) but they continue to struggle with the schizophrenia that seems to be incorporated in the idea that micro and macro worlds can be explained consistently with uniform theory.

Associated with these meta-theoretical concerns, there is an apparent paradigm crisis in the evaluation (Virtanen, Uusikylä) of policy interventions' overall impacts. A representative case in point here is a disagreement when social values are incommensurable over assumptions about the aggregation of numerous policy impacts (micro level; as assessed by participating experts in the strategic impact assessment, SIA) into summary (macro) conclusions that are proposed to the decision-makers. The lack of explicit justification of the aggregation procedure is the Achilles heel of the evaluation effort (Scriven). To go further, there is an urgent need to look carefully at the foundations of the aggregation and synthesis methodology (Scriven).

Approach

A new (generation of) SIA is needed to cope with social complexity and take into account all insurmountable social perspectives in integral and balanced way. There are two independent sources or axes of incommensurability in IA: (i) because of different scope of policy intervention, such as economic, social, natural and human (incommensurable scope, I-scope; Munasinghe; Ekins) and (ii) because of different scales, micro, meso, or macro, across which the assessment needs to provide conclusions (incommensurable scale, I-scale; Easterling; Evans et al.). Thus, social phenomena that are incommensurable in scope and scale are complex.

Incommensurability is treated differently in various IA methods. To simplify a derivation of the problem, only the most standard, impact matrix approaches, are taken into account. Three types of SIA that apply impact matrix approach can be distinguished: Leopold's disaggregated SIA, Leopold-Ekins-Medhurst's (LEM) aggregated SIA and Leontief's partially aggregated SIA (Radej).

Matrical SIA was introduced with Leopold's matrix (Leopold et. al), which is a detailed (micro) but all encompassing expert-based assessment of impacts of all possible economic measures (100) on all possible (88) environmental impacts. In this approach, the evaluator's view is atomised, which means that the multi-scale aspect of the assessment remains absent. It is concerned with two scopes only – economic and environmental – and studies the possible impact of the former on the latter. In this IA approach, the quantitative summation of different impacts was explicitly refused because of their assuming incommensurability - or more precise – because of antagonism between them, which is methodologically implied assuming one dimensional causality between economic and environmental scopes.

Rejection of summation in SIA is problematic. In the absence of summation SIA generates 'information overload' and produces banal answers to complex and multidimensional societal problems (Virtanen, Uusikylä). Recently Ekins and Medhurst proposed a more aggregated SIA method that takes into account the multiple-scope perspective. They proposed a matrix that is a

vertically and horizontally reduced version of Leopold matrix where the columns are condensed on the four main I-scopes (LEM) hey further allowed for vertical aggregation of all policy impacts, represented in rows of their matrix on each particular I-scope as assumingly not breaching incommensurability of policy impacts (see Table 1, below). Similar solution has been adopted also in the territorial impact assessment (Camagni; Radej, forthcoming).

However, many authors made it evident that the impacts of different policies are not homogeneous (Schnellenbach) and produce differentiated effects. Policy measures do not only directly and predictably impact the targeted impact area, but also by and large unpredictably affect all other, 'indirectly' impacted areas. Institutional interventions should be addressed in terms of their inadequacy due to their specialization against the general interest they serve (Donzelot in Burchell et al). Empirical studies confirm the bias of policies that had previously been taken as the most neutral, such as monetary (Lucas) and tax policy (Leith, Thadden). The consequence is that LEM's vertical aggregation of various policy impacts on the same I-scope is inappropriate (see Table 1), as the effects of individual policy measures on each I-scope can be aggregated only by the same source and by the same area of impact, i.e. partially.

As incommensurable in their macro-impacts, policies can only be comparable in an overall picture without recourse to a single value (Martinez-Alier et al). This is a precondition for 'preservation of the negation' (Ostmann) between I-scopes and precondition for preservation of perspective of complexity in social research.

The conclusion from the comparative study of two conventional IA approaches is that both micro and macro SIA individually fail to represent 'realistically' the social complexity in the scope and even more in the scale aspect. The consequence is that standard SIA is particularly vulnerable for misrepresentation of the summary results (such as regarding which SIA conclusions, micro or macro, should be interpreted from the aspect of balance and which from the aspect of integration of incommensurable aspects of development; Radej). Even worse, as conventional SIA is not backed

with consistent theoretical base, such manipulation takes place unconsciously and unintentionally which makes it in particular damaging.

At the intersection between complexity and strategy new SIA is needed that will be able to cope with social reality in scope and scale consistently and non-discriminatingly. Term 'strategic' is conventionally refereed in IA to covering large and wide-ranging policy interventions, with differentiated impacts on various areas of impact, observed from the perspective of the entire system. Such understanding is far too simplified. For example, it does not allow to distinguish between strategic and complex aspect of social phenomenon. This suggests abandoning quantitative understanding of 'strategic' as 'wide-ranging, differentiated, and top-down', and substitute it with one that is substantive and rooted in complexity. New methodological development in SIA shall be framed with two basic concepts: the concept of the strategic (assessment of policy impacts) and the concept of complexity (of social phenomena; Rotmans et al, 2001, 2006; Dopfer et al., Dopfer). The later has been defined above as linked to incommensurability of social phenomena and SIA serves to explain relationship between them. Why? To see this, distinguish between simple and strategic IA. In the first case, evaluator assesses primary or intended impact of policy on targeted area of impact. Variation of this type of assessment is environmental impact assessment with Leopold's view where secondary or side effects of policy measures or commercial enterprise on the natural environment are judged. The same assumption for both types of simple IA is that cause and effect are uniformly separated and can not be interchanged. On the other hand, strategic assessment studies different policies' impacts *on each other primary concerns* that are as such incommensurable. Here causality goes in all directions – hence every element of equation is primary (or cause) in one situation and secondary (or consequential) in all others. Strategic than strictly refers to *interactions or overlapping* between primary systems of complex social phenomena (Picture 2/A).

There is a well known and respected difference between a direct output or effectiveness of a policy and its total impacts. But in a strategic view, there actually exists *nothing like indirect impacts or*

side effects; all impacts are direct, this is easily understood from the perspective of the victim, only that sectoral policy-makers and evaluators are always more or less ignorant for certain parts of social complexity.

Strategic insight than requires relational view of scope-specific social phenomena which suggests to apply a special type of assessment matrix that is quadratic (Radej) – this condition is satisfied in Leontief's input - output matrix, where sectoral policies (differentiated by their primary area of impact) represent its inputs and their impacts on I-scopes represent its outputs. This leads one to propose transformation of LEM into Leontief's impact assessment matrix (see Table 1)

Table 1: From Simplistic to Strategic Concept of IA

LEM impact assessment matrix					→	Leontief impact assessment matrix				
Impacts / Policy measures	Incommensurable scopes				Translate	Impacts / Measures	Incommensurable scopes			
	Econom.	Human	Social	Nature			E	H	S	N
Value added growth	3	1	-1	1		Economic (E)	3	1	-1	1
Tourism	1	0	0	0		Human (H)	0	1	1	0
Health	0	1	1	0		Social (S)	3	1	2	2
Rural development	3	1	1	2		Nature (N)	1	1	1	1
Infrastructure	3	1	2	2		Legend: Impacts assessed on a scale from -3 to +3.				
Environment	1	1	1	1						
~~Total impact of the programme~~	~~2~~	~~1~~	~~1~~	~~1~~						

Source: Case study "Sustainable Impact of Development Programme for Pomurje, Slovenia (2007-2013)", Radej

Leontief's view of I-scopes presents both direct impacts (on the diagonal) and strategic impacts (non-diagonal elements). It is also very practical for IA because it enables to introduce new tools in IA that are well known and widely used in economics such as social accounting tool of integral accounts and econometric tools such as correlation matrix (see Picture 2-B3 below). This enables to model social, human and ecological facts as economists do, without losing social and other essential non-economic explanatory factors.

This has crucial consequences for the new SIA methodology because in Leontief's perspective its focus transforms substantively: it is not any more to assess direct policy effectiveness – achievement of goals within given constraints. This is only the first step that provides 'raw material' for the assessment on the micro level. In the second step this material is transformed into Leontief's

presentation of scope specific strategic trade-offs. Thus, LEM is abandoned in SIA.

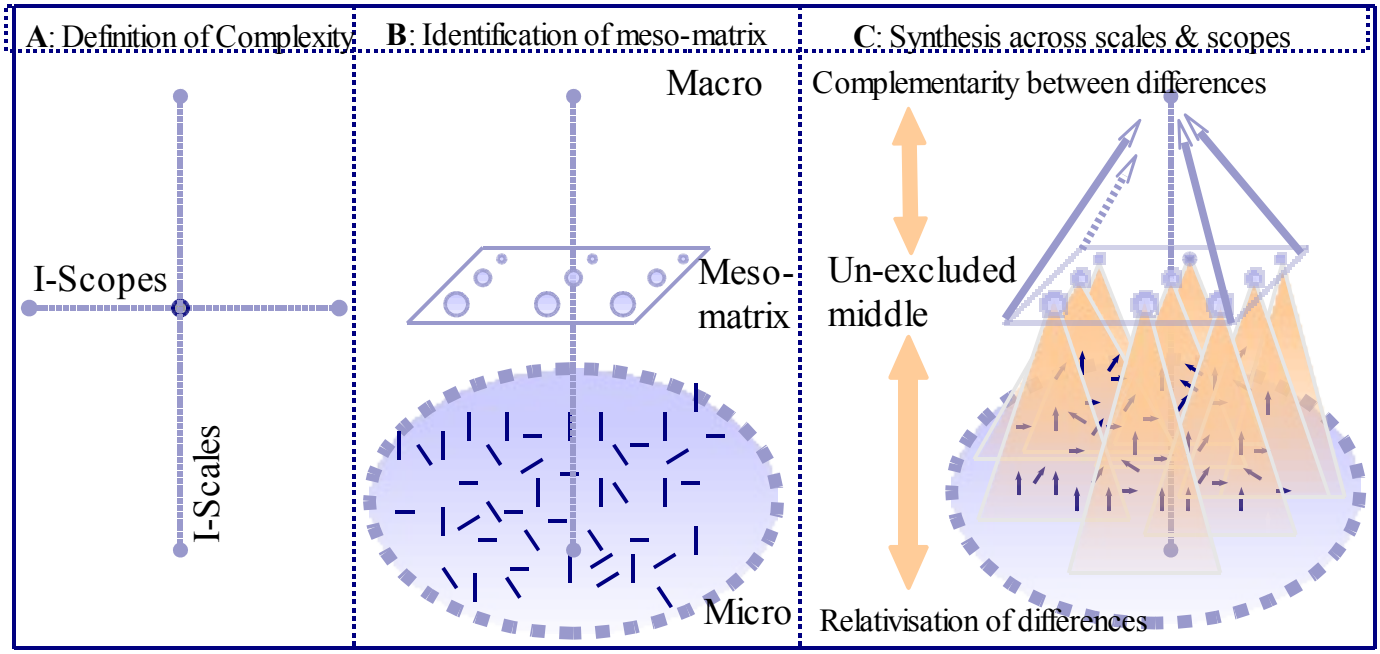
Leontief's view explains scope dimension of social incommensurability. Yet this is not already the solution. I-scales have yet to be addressed: Leontief's matrix exists hierarchically above the micro-level because it is derived from it; at the same time as a partial aggregate it exists at a lower level than the macro-level. The Leontief's matrix of I-scopes presents the social reality in an intermediate, or meso view. In the meso-level, micro-events are organized into domains or scopes which then construct a base on which the macro-view can be founded (Dopfer). When I-scope and I-scale aspect intersect, a meso-matrical perspective is obtained. This view is integrative because it:

(1) assesses micro and macro reality under their own specific conditions. On micro, evaluator sees chaotic but also self-organising diversity of unique elements (individuals, policy impacts, scientific claims; Picture 1-B): direct oppositions between contradictory impacts assessments are mutually neutralised on the micro level while similarities are accumulated on meso level into the matrical perspective of I-scopes. Social reality as a whole is evaluated at the macro level in its complex unity (Picture 1-A); its task is to identify and isolate antagonistic (binary, not structured as complex) conflicts from social plurality.

(2) combines I-scopes dimension of complexity with I-scales which gives 'Cartesian' (coordinate) presentation of social reality (Picture 1-A). Intersection locates a meso-matrical plain from where the summative assessment is possible as neutral because it is situated in an 'unexcluded middle' (see Braudel, French historiographer of the *Annales* school, and 'the world system analysts'; Wallerstein). This is because meso-matrical view is 'pluraly-relativistic' (to use the concept that was introduced by American anthropologist Geertz, 2000 in Renselle) which means that it indiscriminately covers many relative, parallel, scientific views (I-scopes) of one closed reality/universe (society) containing many (pre)existing substantial contexts (I-scales).

In the meso-matrical procedure, complexity does not prohibit summative strategic assessment, just the opposite, it is its main systemic precondition.

Picture 1: Schematic presentation of Meso-Matrical Impact Assessment



Source: Radej

Results

MIA has been practically applied twice. The first for the assessment of sustainable impact of the regional development programme (Regional Agency Mura, Slovenia; see Table 1). The second time it has been used for the needs of ministry for environment to assess impact of Slovenian energy programme (SEP) on the territorial cohesion (TC). Results are presented in Picture 2 which is divided in three sections: A clarifies its focus and approach, B interprets obtained summary results, while C graphically summarises. B is also divided in three parts: B1 presents Leontief's or meso-matrical view of SEP's impact; B2 interprets direct impacts of SEP, and B3 explains strategic (overlapping) impacts of SEP. Direct impacts of SEP on three spatial subsystems, economic, socio-cultural and physical, are mostly positive, which suggests that impact is relatively satisfactory. In particular SEP's measures that are primarily earmarked for the good of physical subsystem (F∩F) will be effective. However, this surface prediction hides more structured facts that impact of SEP is cohesively ineffective and territorially discriminative. It is seen that F and in particular S are neglected relative to E (B3). In spite of that SEP's impact on territorial quality (S∩F & F∩S) is moderately strong, but contribution of SEP to the improvement of territorial efficiency is only

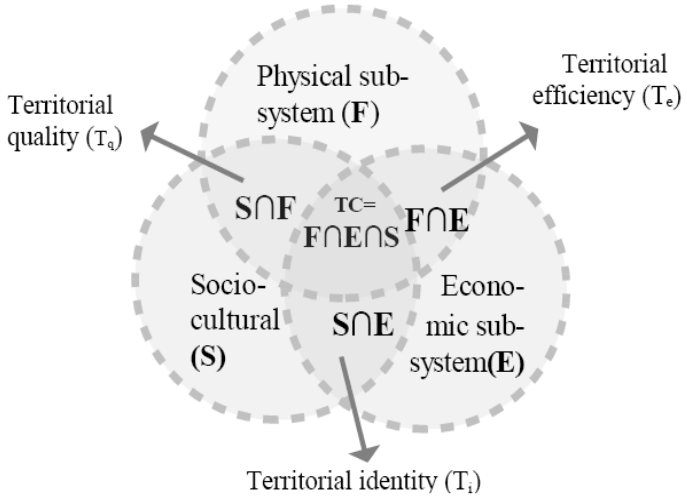
weak. These assessment results are intriguing when compared on the different levels of explanation. In summary (Picture 2-C), SEP's impact on TC is not satisfactory in volume (small shaded area), nor in its composition (in between three domains or scopes of territorial cohesion).

Picture 2: Accounting for complexity in SIA in practice

A. Problem of SIA

Territorial cohesion is defined as overlapping between socio-cultural, S, physical, F, and economic, E, subsystems of a spatial system (ESPON, 3.2, 2006; Camagni).

Definition of the Territorial Cohesion (TC)

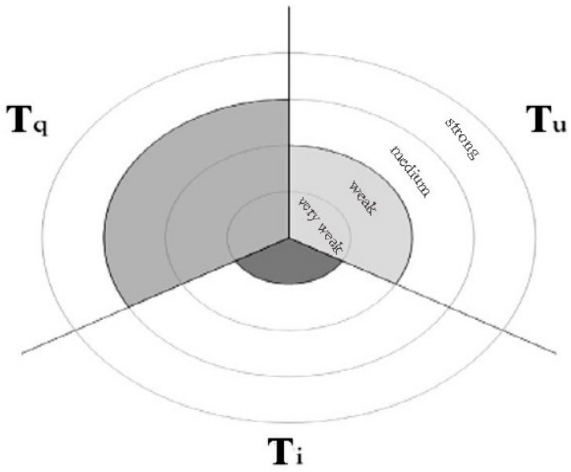


Legend: S∩F means intersection of subsystem S with the subsystem F and the intersection of subsystem F with S, etc.

C. Graphical presentation of SIA results

Summary impact of SEP on the components of TC: T_q, T_i, and T_u

SEP's impact on TC



Legend,: From the inside out - very weak; weak; medium; strong positive impact.

B: Interpretation of summary results from the assessment of SEP impacts on the Territorial Cohesion

B1. Leontief's matrix of impacts				B2. Simple IA (Direct impacts; on the diagonal)		B3. Strategic IA ('Secondary' impacts; (co)relational view)				
	E	S	F	Inter-section	Estimated impact and interpretation	Com-ponent	'Overlapping' impacts		Complementarity of impacts (correlation view)	Balance of impacts (relational view)
E	1	0	0	E∩E	1 Weak	T_i	E∩S=0	S∩E=1	Very Weak	No, S is neglected
S	1	0	2	S∩S	0 Neutral	T_q	S∩F=2	F∩S=1	Moder. strong	No, S is neglected
F	2	1	2	F∩F	2 Strong	T_u	E∩F=0	F∩E=2	Weak	No, F is very neglected

Legend : B1, B2 = scale from -2 to 2): 0 = neutral/absent impact; 1 = weak impact; 2 = strong impact; B3 = scale from 0,0 to 2,2,): (0,0) = neutral/absent; (0,1 or 1,0) = very weak; (1,1 or 2,0 or 0,2) = weak; (2,1 or 1,2) = moderate; (2,2)= strong. Source: UIRS, 2008; Radej, 2008 (forthcoming as long summary in the Working Paper series of Slovenian Evaluation Society, September 2008).

The methodological conclusion from MIA is that complex social phenomena, such as TC or sustainable development, shall be assessed on three levels: (i) for its primary and secondary impacts (G∩G, S∩S, ..., G∩S, S∩F, ...), which is a challenge for participating scientists, (ii) relational

assessment of strategic reciprocity of impacts between two subsystems - its meaning is more in the domain of value judgements; (iii) with correlation assessment - its meaning is determined more in the domain of meta-ethical judgements, epistemic and universalistic claims. Standard SIA that is practised in EU is concerned, strictly speaking, only with the first of them which is the reason for its relatively small contribution to the declared goals of the assessment.

Discussion

Practical tests confirmed that different summation procedures provide us with irreconcilable assessment results. The divergence is of course not due to different detailed expert assessment of impacts but arises entirely from the aggregation method. In both background studies, these different impacts are explained by the treatment of incommensurability in the summation procedures: in Leopold's IA, impacts are understood as strongly incommensurable which prohibits any summation; in Leontief's context impacts are treated as weakly incommensurable, allowing for their partial aggregation by source and area of impact; LEM methodologically ignores policy aspect of social incommensurability on micro and meso level. Thus it is confirmed that appropriate – meso-matrical - treatment of incommensurability is crucially important for proper understanding of IA results.

MIA is based neither on the pure categories of science (facts) nor of ideology (values). Pure categories are necessary to understand abstract issues. Theory is inhabited with terms of thought but practice and every day life of policy-makers is inhabited with relativity of meanings that are necessary to appraise these theoretical abstracts socially. Scientific and political programmes do not share the same mission. Conclusion is that theories are not able and thus should not be invited directly to communicate with social reality where probably unknown number of different truths operates simultaneously and make it indeterminate for a particular observer. Social reality needs to be assessed as overlapping between pure categories – this means it needs to be explained with hybrid terms. MIA explains contradictions and conflicts that are linked to policy interventions

because it preserves the fundamental oppositions of social reality unaltered. These should be probably well understood by evaluator as an expert for comprehending differences and oppositions between values and between facts, as well as between values and facts. In this way, evaluator is seen as a social conflict accountant. From the meso perspective, she can invoke ‘the Foucault effect’ (in Burchell et al), depriving some social practices (simplistic, antagonistic) of their self-evidence, extending the bounds of the thinkable and progressing of reason to permit the invention of others (complex practices) and in this way become a real factor of change. Meso-matrical IA enables, replacing antagonistic conflicts with incommensurable, to make use of conflict instead of trying to eliminate it.

This reverses the problem as given at the beginning: when irreconcilable differences in scope and scale are not observed as antagonism any more as it is 'normal' with politicians and scientists, but as value incommensurabilities (as evaluators observe them) instead, then they become progressive element in transformation towards post-antagonist societies. Therefore recognition of incommensurability in IA and in social affairs in general is not a problem to be solved (or denied and ignored) but exactly the opposite, the recognition of incommensurability is a point of departure from antagonistically simplistic and reductionist assumptions in summative strategic impact assessment that currently prevail.

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Colophon

About Author:

(1) Bojan Radej is an independent researcher from Ljubljana (2004-), president of Slovene Evaluation Society. Master degree in macroeconomics, University of Ljubljana - Faculty of Economics (1993); free researcher at the LICOS (1994), JAICA (Tokyo, Hokkaido, 1993).

(2) Professional Experience Record: (i) Governmental Institute of Macroeconomic Analysis and Development (1987-2004; Under-secretary and Adviser to the Government), areas of work: sustainomics; chief manager of the modelling department (1993-5); initiator and the first editor of Slovenian Economic Mirror (1995-8); Co-Editor of IB journal (2001-2004); (ii) University of Ljubljana, Faculty of Economics (1996 to date), assistant lecturer in Economics of Environmental Protection (author of a program and study scripts).

(3) Social engagement: (i) Founder of Slovene Evaluation Society (2008); (ii) Co-founder of Slovenian E-forum on economy, environment and energy (1995-02); (iii) Membership of professional bodies: Slovene commission on sustainable development (2001-2); National climate committee (2001-04); Supervisory board of Slovene environmental development fund, member (2000-4); Slovene statistical council on environmental statistics (2001-4). (iv) Activist. He contributes to the establishment of an alternative autonomous economic and social communities, media, and infrastructures.

About MIA:

(1) Phases of development: first, Nov'06 – Final project report, FP6/SRDTOOLS; second, Maj'07, Working paper, Institute for Economic Research and Economic Faculty, Ljubljana; third, Jun'08 – accepted for publishing in Slovene, Časopis za kritiko znanosti; Jul'08 – Working paper version 2, SSRN; fourth, nov'08, Slovenian version published in Revija 2000; next English version in Jan'09.

(2) Peer reviews: Universite De Versailles Saint Quentin En Yveline (2006, research team in EU's 6th FP), Faculty for Social Sciences Ljubljana (2007, lecture in course for Policy analysis), Institute for Economic Research Ljubljana (2007, lecture given to Slovene academic and consultancy experts), Slovenian Evaluation Society (2008, lecture to Slovene experts).

(3) Reviewed by editors: Institute for economic Research (2007); Economic faculty Ljubljana (2007); Časopis za kritiko znanosti (2007); Revija 2000 (2008).

(4) MIA has been practically applied twice: (i) in an ex-ante IA of the Regional development programme for Pomurje region 2007-2013 in Slovenia (Radej; financed by the EU's 6th framework research program); (ii) the territorial IA of national energy program on the spatial cohesion of Slovenia for the ministry of environment (Slovene Urban Planning Institute, 2008; Radej, 2008, forthcoming).

About discussion initiative:

This discussion initiative is meant entirely in good faith and for voluntary participation. It is not financed, initiated nor supported externally by any means. Neither contributions to this discussion, nor its results will be published or used against the wish of participants who remain exclusive authors of their contributions. The sole purpose of the invitation is communitarian broadening insights into the problems raised. I am explicitly denying any other prior assumptions about the participants except their expertise as well as any later consequences arising from the eventual participation. I personally stand responsible for these statements to the contributors and to the Slovenian Evaluation Society. My contribution to the discussion will be given in the creative commons licence to which this text in integral also subjects.