Sustainability science as a basis for policy evaluation

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Sustainability Science as a Basis for Policy Evaluation

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Abstract
Sustainability is a rather hard-to define concept and its definition may vary depending on the level of importance of the issues concerned or listed by policy makers. Its meaning may sometimes even be related to policy agendas. Clearly, the concerns of policy makers and governments do not necessarily meet the needs of all stakeholders or public at large. Such a multi-angled, multi-dimensional and multi-tasked process deserves a systemic way of thinking and evaluating. Therefore, this study aims to present a systemic policy generation and evaluation process, on the basis of five European countries, i.e. Finland, Italy, Romania, Scotland and Spain. The study addresses case studies on sustainability policies and sustainable development in these five countries, which have clearly country-specific concerns. This study concludes by offering policy lessons for sustainable futures.

Keywords: sustainability, policy making, systemic process, stakeholder

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1 SUSTAINABILITY IN POLICY DISCOURSES

The concept of sustainability is the most often used terms of all times. It has already a long history and reflects the environmental longevity of the earth for long terms. Coined first in 1712 by Carl von Carlowitz, the term was forgotten until the 1960s and 1970s (Scoones, 2007). Showing the connection between environmental and development issues, sustainability and sustainable development have in the past decades acquired a prominent place on policy agendas in both developed and developing nations.

Starting from stressing environmental issues, today the phenomenon has become a main concern for many sectors and stakeholders. Therefore, sustainability is conceived of as a multi-dimensional policy concept rather than as a neutral/environmental concept. Thus, sustainability science nowadays is concerned with a scientific effort to provide or suggest solutions to real-world, often place-based, problems encountered for the needs of a sustainability transition (Kates et al., 2001).

It is difficult to provide unambiguous answers to sustainability questions due to their complex structure and thus, any response to these complex problems is reflected in sustainability policies. A policy needs a solid foundation to direct decisions and to offer rational outcomes of evaluation procedures. A policy is often a vehicle to cope with possible weaknesses in future strategies and to transform potentials into strengths, while linking scientific outcomes to the needs of stakeholders. It should certainly – but not exclusively – address public goods and welfare optimization that cannot be reached by markets alone. Therefore, policy tools should incorporate solutions for general problems, even with a limited scope, while focusing on specific concerns put forward in a policy agenda.

Although sustainability is not anymore seen as exclusively environmentally-oriented, it is still difficult to differentiate sustainability policies from environmental ones in modern policy discourses (Pezzey, 2004). Sustainability as a broad future quality-of-life concern of each nation and person is included at different levels in many policies and at different scales. The inclusion of sustainability in policy strategies is a sine qua non to improve the sustainability orientation of an area, while developing at the same time a sustainable future.

The European Union (EU), which is the most influencing policy institutes in Europe, was one of the first bodies that aimed to explicitly include sustainability into its policy discourses and agendas. The EU interprets sustainable development as a general strategy to meet the needs of present generations without jeopardizing the ability of future generations to meet their own needs. This includes inter alia a better quality of life for everyone, now and for generations to come. The EU recognizes the difficulty to obtain sustainability only by public policies, but argues that an active involvement of each stakeholder may help to achieve sustainable futures.

The aim of this paper is to explore a road from science to policy in order to reach sustainability, while testing possible pathways on the basis of five European countries. Given this general perspective, the present study will focus on case-studies from five European Union member states. These five case-studies, within the EU-project SMILE, aim to map out conditions for a sustainable future. Sustainability concerns are analysed in the forest sector in Finland, the agricultural sector in the Naples region in Italy, the energy sector in Romania, the national park Cairngorms of Scotland, and an analytical toolkit for the energy sector in the Catalan region in Spain. Even though the sustainability understanding in each case study is more or less similar, the concerns and issues related to sustainability differ significantly among each other.

On the basis of the above mentioned observations and experiences, this paper is organized as follows. Section 2 will discuss some modelling and theoretical backgrounds of sustainability research, while Section 3 builds on this by offering a two-folded framework to support sustainable development research. Next, Section 4 introduces the five case-studies and their stakeholders involved in our research (see Appendix), and discusses current sustainability policies in the above mentioned countries by showing gaps and overlaps in interests of science, policy and society. Section 5 then presents some policy strategies, and recommends policies with some policy lessons retrieved from the findings of our research. The study concludes by highlighting future steps and pros and cons of a complex systemic trade-off process.

2 MODELLING SUSTAINABILITY

Sustainable development is a global concern dealing basically with the continuity of ecological assets, while offering fruitful seedbeds for economic activities that strengthen the continuity of both ecological and cultural assets. Both in theory and practice, we observe and recognise the mutual interaction of both global and local actions (Munda, 2004). But when it comes to modelling sustainability, an operational interaction is seldom achieved. The main concerns originate from the different perspectives of modellers or the research clients who asked for modelling in an appropriate manner sustainability.

Sustainability models may be diverse, but integrate mainly three different perspectives, viz. ecological, economic and political models (Jenkins, 2011). Of course, in practice also a combination of two of them is possible. Ecological models sometimes and to be more conservative compared to the other two classes and to focus more on the protection of natural reserves rather than on their use without exhaustion. In addition, economic models cover sustainability often as a form of capital and thus, seek to protect opportunities in this specific form. Political models seek to sustain social systems. As a combination of two models, ecologically sustainable economic development models entail two conditions: first, environmental sustainability regarding biological balance and evolution, and second, availability of natural resources for the production process (Bithas and Christofakis, 2006).

Moreover, although sustainability has an overall accepted meaning, which deals with the capacity to maintain the current situation over time, different approaches to sustainability create controversy in sustainability debates. For instance, in the agricultural sector or forestry where material extraction is crucial, sustainability corresponds to the continuity of resources, which can be exhausted due to the overuse of the sector (Jenkins, 2011). Although this is a clear case for economists and ecologists, socio-economists tend to believe that the sustainability of economic activities depends on social networks, trust and awareness of people (Granovetter, 1985). Therefore, sustainable development cannot be envisaged, both theoretically and practically, without a common framework for ecological, economic and social systems together. It should be added that these three systems are even theoretically not sufficient to ensure sustainable development. All three types of modelling need ideally an institutional system to be managed by seamless policies. It is thus clear that for human dignity and for the protection and continuity of natural areas a decent contemporary physical environment is needed.

3 A FRAMEWORK FOR SUSTAINABILITY POLICY EVALUATION

Each sustainability study has to start from a conceptualisation and operationalization of sustainability. The different foci and different perceptions of sustainability are leading policy makers and researchers to find their own way in supporting sustainable development by using their own anchor points and definitions. In the present study, we will focus in particular on the complex systemic structure in relation to the concept of sustainability. In this section, we will first offer the design of a conceptual framework, and next a sketch of the meaning of sustainable development. Finally, we offer an operational framework to generate and assess sustainability policies.

3.1 Conceptual Framework

The sustainability concept is not only related to environmental issues, but also to social welfare or cultural diversity. Sustainability - and also sustainable development - is based on the complexity of these systems. The literature presents different components of sustainability and sustainable development; we have summarized these factors by using a so-called pentagon model in order to cope with the systemic and cyclical structure of each component of sustainability.

In the literature, there are several applications of the pentagon model, which have demonstrated its methodological power and empirical validity in various studies (see, e.g. Nijkamp et al., 1994; Nijkamp and Pepping, 1998; Capello et al., 1999; Nijkamp and Yim, 2001; Nijkamp, 2008) in dealing with systems thinking on the evaluation of a multidimensional complexity (Nijkamp, 2008). It is argued that five is a plausible number to identify necessary factors for success. To ensure or achieve sustainable development, we will talk about five factors/concepts that are vital for sustainable futures to happen. These are: the ecological system; the economic system; the social system; the physical system; the institutional system (see Figure 1).

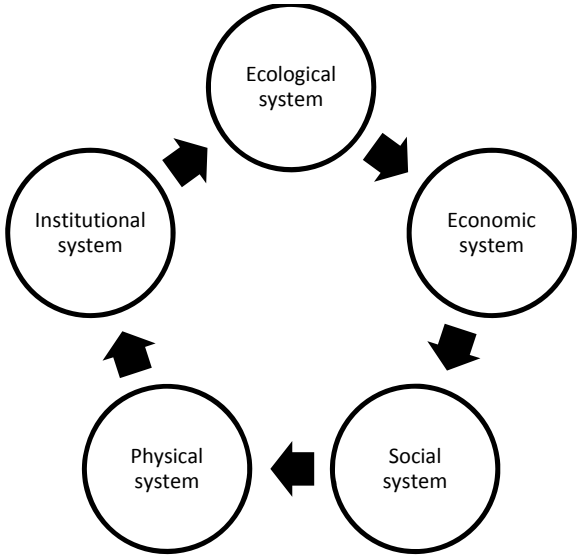

Figure 1. A pentagon of five critical factors for sustainable development

Our first vital factor is the ecological system. When we think about sustainability and the start of the sustainable development discussions, we know that they were mainly based on ecological considerations. Clearly, to speak about sustainability without the involvement of ecology is not realistic. In other words, the ecological system is the heart of sustainable development. Therefore,

our first pentagon factor – the ecological system – refers to both the quality and quantity of the natural environment as well as to the environmental impacts addressed. A second vital concept inherent in sustainable development is the economic system, which covers economic diversity, uncertainty and eco-friendly ways of production. In the literature on sustainable development, it is argued that neither development nor economic activities can be realized without the involvement of social systems. Therefore, our third vital concept is the social system that is related to social networks, quality of social (infra)structure and the levels of awareness, understanding and openness of society at large. Clearly, two more missing vital factors in order to achieve sustainable development have to be added. One is the physical system, which means the physical conditions and technological advances for sustainable development, which are needed for the quality of life and social welfare of the people. The last - and another most important - factor for sustainable development is the institutional system. This is vital in terms of the administrative and management issues, as well as the quality of political decisions and policy implementations. Having now briefly explained the conceptual framework for our research and our understanding of sustainable development, we will in the following sections offer an operational perspective on our research and its outcomes.

3.2 Operational Framework

Within the above mentioned science-society interaction, academic institutions are only one site of knowledge creation; sustainability science forces us to do research with - rather than on - policymakers and stakeholders who are pursuing sustainable development. This research approach incorporates new challenges, as it transforms what is researched (Maasen et al., 2006). Thus, reflexivity and co-learning between actors is crucial to sustainability science, prompting a reflection on how individual prejudices and experiences influence research practices, as well as drawing attention to the socially constructed and contested nature of 'evidence'.

Our operational framework consists now of six steps (Figure 2). It starts with a scientific research understanding, which is followed by a participatory structure and ends as a policy maker understanding. Thus, our first step is to sketch the necessary conditions to achieve sustainable development. Therefore, we formulated our sample from five different case study areas dealing with different sustainability aspects. We explored each case-study area with the help of a set of first inventory questions answered by local/national partners. With this inventory, we succeeded to specify our conceptual framework that we obtained at the end of this stage as a basic pentagon model.

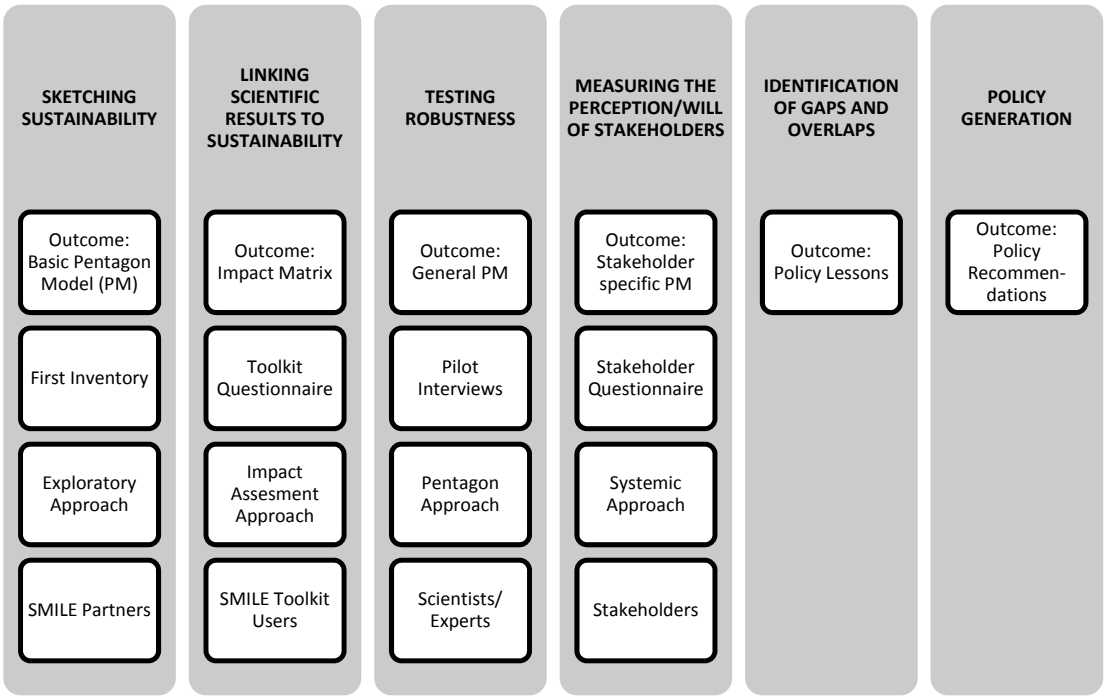

Figure 2. Operational steps of the research

The overall methodology is based on the SMILE toolkit. This set of methods is basically a multi-method integrated toolkit. It consists of the integration of three evaluation frameworks, viz. Advanced Sustainability Analysis (ASA), Sustainability Multi-criteria Multi-scale Assessment (SUMMA), Multi-Scale Integrated Analysis of Societal and Ecosystem Metabolism (MUSIASEM). It was developed within the EU-funded consortium called Development and Comparison of Sustainability (DECOIN) and applied within the consortium Synergies in Multi-Scale Inter-Linkages of Eco-social systems (SMILE). The toolkit is developed to provide prominent empirical features that are required for (i) monitoring policy-making, on the basis of the analysis of the different dimensions of sustainability and for (ii) the analysis of the trade-offs and synergies between different aspects of sustainable development. The dynamism and the multi-dimensionality of sustainability and also the integrated nature of the toolkit itself have led us to test the usefulness of the toolkit in order to link the results obtained to real-life sustainability issues. To this end, we have created an impact matrix showing the usefulness of the toolkit for envisioning sustainable development. Later on, we tested our results from the first two steps by pilot interviews conducted with local/national experts that helped us to identify possible shortcomings before conducting the stakeholder survey questionnaire in the fourth step. The fourth step was a critical stage, in which stakeholders were included in our research. This was the most important step, through which the robustness and the generalisability of our findings in policy-based evaluation exercises was assessed. At the end, in order to come up with relevant policy recommendations, we also identified the overlaps and gaps and formulated lessons derived from it. This step took us to the final stage, i.e. the specification of general policy recommendations.

4 FROM SCIENCE TO POLICY: A STAKEHOLDER-ORIENTED PATH FOR SUSTAINABILITY

In this section, we will map out in greater depth last two steps of our analysis in order to show how we linked scientific knowledge and creativity to the policy evaluation stage, with the help of contributions of different stakeholders. Stakeholders appear to be crucially important for the implementation of sustainable development policies and plans. Therefore, we will experiment how much they are involved in sustainability discourses and how much their perceptions correspond to and are reflected in policy discourses.

4.1 Sample

Sustainable development has to find a balance between different conflicting objectives and courses of action. There are in general multiple stakeholders, each in charge of a specific interest. In general, a stakeholder is someone who is interested in, involved in, and feels responsible for, a certain issue. Stakeholders can be politicians, branch organizations, action groups, environmental organizations, NGOs, but also non-organized groups such as households or single farmers. Some of these actors are perhaps already involved in discussions or decisions, but others not yet, though perhaps they should be.

The case studies treated in our research are rather diverse in terms of sustainability issues, aims, stakeholders and scales. This is summarized in Table 1 to show better the complexity and diversity of our sample. Clearly, the case studies in our sample have several similarities, and the main similarity is that their general approach is sustainability-oriented, while each case-study is focused on a different sector. The case studies have several spatial scales. Some deal with the national scale, while there are also case studies focusing on local or regional scales. There are also other differences. For instance, the Finnish case study was more based on scientific calculations and research that our partners used as secondary data rather than stakeholders. Furthermore, the Spanish case study focused more on the evolution and evaluation of the SMILE toolkit rather than an interacting with stakeholders. In each case study, the main important task was to develop a useful and salient output for the stakeholders for more sustainable environments and for achieving sustainable development.

Table 1 Summary of the five case studies

Case	Aim	Scale	Involvement of Stakeholders
Finland	Forest Sector	National	No involvement
Italy	Agriculture sector	Local; Regional; National	Inclusion of stakeholders at different scales
Romania	Energy sector	National	Topic-related ministries; Households; Action groups; Local authorities; Companies
Scotland	Cairngorms National Park (CNP)	Regional	CNP Authority; National stakeholders; Regional stakeholders; Local stakeholders
Spain	Energy Sector	Regional	No involvement

Basically our research, depending on its framework, involved several different stakeholders from each case study area, with different levels of involvement (Table 2); see appendix A for a complete list. The first group of stakeholders was made up by the research partners themselves. They had a great role during the research conducted. Their response to the first inventory was helpful to draft a

tentative conceptual framework, which was the basis of our research. The partners had also a primary role in the evaluation of the impact of the SMILE toolkit on sustainability. In addition to our partners, during the pilot interview and also during the stakeholder questionnaire process several groups of stakeholders got involved in subsequent steps until the stage of evaluation and development of policies.

Table 2. Stakeholders involved in the process

	Step 1: Sketching sustainability	**Step 2: Linking scientific results to sustainability**	**Step 3: Testing robustness**	**Step 4: Measuring the perception of stakeholders**	
Finland	1 questionnaire for each partner	1 questionnaire for each researcher using the SMILE toolkit	2 Researchers 1NGO representative 1 Researcher / Forest owner	18 Stakeholders	
Italy			2 Researchers 3 NGO representatives	55 Stakeholders	
Romania			2 Researchers 3 Administrators	52 Stakeholders	
Scotland			Interviews were conducted in a specific way (see Akgün et al., 2011)	34 Stakeholders	
Spain			4 Researchers 3 Administrators	13 Stakeholders	
Total	5 Stakeholders	11 Stakeholders	21 Stakeholders	172 Stakeholders	***209 Stakeholders***

The stakeholders allowed us to come up with both general sustainable development policy proposals as well as with case-study specific ones. In the following subsections, we will sketch the path from science to stakeholders and from policy to stakeholders and how to link sustainability science to policy development.

4.2 Linking science to stakeholders

Scientific knowledge and understanding is the beginning of new insights and hence, a very important step to develop sustainable environments. But if the scientific process is not appreciated or understood by stakeholders – for example, NGO's, governments, the business sector, or local employees or residents –, the achievement and implementation of the results cannot be realized. Therefore, to recommend appropriate policies and to achieve sustainable futures, it is important to identify the overlaps and gaps between a scientific and other stakeholders' understanding of sustainable development.

Overlaps

Scientists and stakeholders tend both to believe that sustainable futures are a must for their own futures and that of the next generations. But the way they understand sustainable development may be quite different. Based on the literature and the results of interviews with scientists and stakeholders, we can distinguish three main aspects of sustainable development: economic, social and ecological, while institutional and physical aspects are the conditioning factors to obtain this in

the future. The ranking of the three main factors may differ between scientists and stakeholders, while the conditioning aspects may be overlapping. Both groups agree on the relative importance of the institutional system, especially in terms of integration between institutions and policies and a strong continuity in plans and ideas. Furthermore, the physical environment – especially in terms of the quality of infrastructure, the level of technology and innovation, and the level of accessibility by car and public transport – is considered to be important as well.

Furthermore, there exists an overlap in the evaluation of the importance of human capital, openness of society to new ideas and developments, and the quantity and quality of ecosystems. This shows that education and skilled labour, societal understanding, and environmentally-benign behaviour, e.g. regarding ecological resources, may be seen as main challenges of today and the future.

Gaps

Scientists often speak another language than stakeholders and society do, which can make them difficult to understand and may frustrate communication. This was also one of the limitations of our study, as expressed by the stakeholders involved. Gaps or disagreement between views of scientists and stakeholders concern mostly the prioritization of the main aspects of sustainable development. The most prominent gap is related to the importance of ecological systems. For scientists, the ecological system is often the most important factor for sustainable futures, whereas for stakeholders it is frequently the social system. The latter group often ranks in particular the awareness of and the participation in sustainability policies, as well as a diverse economic system, as very important, while scientists focus more on the quantity and resilience of eco-systems and effective governance structures.

Besides our research on the interface of the scientific and societal understanding of sustainable development, the SMILE toolkit developed and implemented in our approach was also very useful to improve both scientific and societal understanding. The results of the impact matrix developed to test the usefulness of the toolkit appeared to be very positive, especially in the domain of the social and policy process in relation to sustainable development. The toolkit appeared to contribute to sustainable development and policy implications in terms of non-economic issues. The difficulty inherent in this toolkit is to spread its usage to a wider group. Therefore, more work has to be carried out in this sense.

4.3 Current policies vs. the perception of stakeholders

A policy is usually produced as a response to a scientific finding. The table below (Table 3) summarizes the existing policies mentioned by the partners as policies related to sustainability. This table thus offers ideas about the understanding of policy makers regarding sustainable development in relation to our findings. It allows to show policy and decision makers existing gaps in policies related to each case study and the impacts of possible future policies on sustainable development.

Interestingly enough, except for the Romanian case study, most stakeholders involved in our survey, did not consider the inclusion of sustainability in the policies as very crucial to obtain sustainable development. The Romanian stakeholders however, appeared to appreciate relatively more the inclusion of sustainability in policies. This is an interesting finding for a country in a transition period and having a transitional economy. According to the current policies of each case study, most policies appear to be related to sustainability from a national scale perspective, while for the Italian and

Romanian policies there appear to exist also an orientation towards the local scale and/or specific sectors. In addition, most policies address all three main aspects of sustainability, except the Finnish policies. In Finland, the social aspect of sustainability is not addressed in the policies. Therefore, stakeholders rank the social aspect of sustainability as the first aspect to be addressed. In addition to Finland, Scottish stakeholders from the Cairngorms National Park also rank the social aspect of sustainability as the first aspect to be dealt with for sustainable futures.

Table 3. Current sustainability-related policies in each case study

Case	Number of Policies	Geographical Coverage	Main aspects	Level of sustainability Inclusion	Results of this study Ranking of aspects
Finland	4	National	Economic Environmental	Main goal Mentioned in one part	1. Social 2. Economic 3. Environmental
Italy	3	National Local Sector Specific	Economic Environmental Social	Main goal	1. Economic 2. Environmental 3. Social
Romania	3	National Local (2) Sector specific (2)	Economic Social	Part of the legislation	1. Economic 2. Social 3. Environmental
	2	National Local Sector Specific	Economic Environmental	Part of the legislation Mentioned in one part	
Scotland	3	National	Economic Environmental Social	Main goal Mentioned in one part	1. Social 2. Environmental 3. Economic
	2	National	Economic Environmental	Mentioned in one part	
	2	National	Economic Social	Mentioned in one part	
	2	National	Environmental	Mentioned in one part	
Spain	No specific policy				1. Economic 2. Environmental 3. Social

When we focus on the stakeholders' opinions, a problem can be identified in the Finnish case study. Although the stakeholders evaluate social aspects as most important for sustainable development, the current policies do not include the social aspect of sustainability. Another conflict can be also seen for the Romanian case study. As Romania is still in a transition period, the country re-evaluates its policies, but current sustainability policies show that although policies include different aspects of sustainability, sustainability itself has not yet become a main policy concern. According to Table 3 we can immediately see that the Finnish and Romanian case-study have difficulties to reflect the wishes of stakeholders in the policies. In the following section, we will now summarize our findings, first in terms of policy lessons learned, while next we will offer policy recommendations focusing on both case-study specific policies and general sustainability policies.

5 FUTURE SUSTAINABILITY POLICIES

5.1 Lessons learned

The problem of sustainability is basically unique and our results show that there is always a common ground for its evaluation. Although we will be able to offer here some generalisations, our results

have also proven that a thorough evaluation needs a clear and specific problem definition, so that sustainability still remains a case-study specific issue.

Table 4 includes the five most important sub-factors mentioned by the stakeholders of each case study. Important sub-factors are the level of uncertainty (e.g. of prices) for entrepreneurs as well as the level of participation in discussions or actions related to sustainability. Those are identified by five of our case studies as one of the five most important sub-factors. Therefore, policy makers need to put more effort in dealing with the uncertainty for entrepreneurs and also in increasing the participation of different stakeholders in sustainability discussions.

Table 4. Five most important sub-factors of sustainability

	Finland	Italy	Romania	Scotland	Spain
Physical System					
Built environment		x			x
Infrastructure					
Technology					x
Accessibility					x
Economic System					
Economic diversity		x	x		
Uncertainty	x	x		X	x
Eco-friendly production			x		
Ecological System					
Eco-quality					
Eco-quantity		x	x	X	
Eco-impact		x			
Institutional System					
Governance			x		
Integration					
Continuity					x
Inclusion					
Social System					
Human capital	x			X	
Awareness	x				
Openness	x				
Participation	x		x	X	

Stakeholders from both Finland and Scotland turn out to attach more importance to the social system, while in the Italian and Romanian cases most importance is attached to the economic system. Although each country is different from the other, Finland and Scotland show similarities in terms of the evaluation of sub-factors, as do Italy and Romania. But Spain is rather different, which can be explained by the different methodological approach adopted in this country.

Table 5 shows the results of an Analysis of Variances between Groups (ANOVA), to test whether the differences between groups of stakeholders are significant or not. If they are significant, it means that different approaches to sustainable development – and therefore information provision – may be useful. It appears from the ANOVA results that the differences in the opinions of the stakeholders are most significant when taking into account the country of the case-study. The most significant

differences appear to be related to the importance of the physical system and the social system. When looking at the differences in answers between respondents from different institutions, it appears that they agree in particular on the relative importance of the physical and institutional system. The differences between the opinions of respondents with different occupations are the smallest. They are only different in the rating of openness of society. In general, the most significant differences show up concerning the importance of the social system.

Table 5. Results of ANOVA tests

Answers	Country	Institution	Gender	Occupation	Education
Physical System					
Built environment	***				
Infrastructure	***		*		**
Technology	***				
Accessibility	***		***		
Economic System					
Economic diversity					***
Uncertainty	***		*		**
Eco-friendly production	***	*			**
Ecological System					
Eco-quality	*	*			**
Eco-quantity	**				
Eco-impact		**	*		
Institutional System					
Governance	**				
Integration					
Continuity	***		*		
Inclusion	*				
Social System					
Human capital	***	**	***		**
Awareness	***		*		***
Openness	***	***	*	***	
Participation	***	***	*		**

* indicates a significant difference at a 10% interval, ** at a 5% and *** at a 1% interval.

The results of Table 5 indicate that no difference needs to be made between different institutions in general. Among all stakeholders, both the social and the ecological system are seen as the ones that could improve sustainable development most significantly. Most respondents appear to have a high expectation from increasing human capital, awareness of the issues of sustainability, and the possibilities to participate in decisions that concern sustainable development. These factors are not so much part of policies, but more a way of how the polices and societies may develop.

When we evaluate each factor one by one, physical and institutional factors are necessary, but appear not to be seen as important as the others. On the other hand, all stakeholders consider the ecological system important, both its quality and quantity. This is important to provide possibilities to regenerate and sustain ecological systems and to ensure the health, diversity and productivity of the environment to the benefit of future generations.

In terms of the social system, our findings show that this is one of the most influential factors for sustainable development, in particular the level of education and training of society and the participation of residents in discussions or actions related to sustainability. Moreover, a social capital

perspective opens up wider alternatives. It focuses on horizontal and vertical relationships, suggesting different forms of coordination and development through the ongoing interaction among stakeholders. This indicates that governments should invest more in human capital and also in the inclusion of people in decision-making, related to sustainable development.

Based on our findings, it seems plausible that governments might encourage more firms to produce in an environmentally friendly way, even if this increases the production costs. Moreover, stakeholders are significantly concerned about the level of economic uncertainty (e.g. prices). This is something that should be taken serious, as it may seriously prevent several entrepreneurs from a sustainable way of producing.

5.2 Policy Recommendations

On the basis of the above explained results, the policy recommendations from our analysis are:

1. Policies should be focused on all three aspects of sustainability in a balanced way, while in particular social aspects should not be ignored in policy development.

2. Especially for the Finland case-study area, the social aspect is mentioned by stakeholders, even though it is not included in sustainability-related policies.

3. For the Italian case study, which consists of historical heritage and physical sustainability, besides the main aspects of sustainability, it appears that the physical system – especially, the built-environment – should also be included in sustainability policies.

4. The Romanian case study is the most distinct one, as it is related to a country in transition. Romania needs a comprehensive policy, in which sustainability may act as a main goal dealing with the three dimensions of sustainability. Besides, while overcoming the transition period, Romania may need to strengthen its governance structure in a more efficient way.

5. Scotland is the case study where sustainability is well covered and most detailed in its policies. However, additional policies, or improvement of current policies, may be carefully constructed, while their focus needs to be more on human capital and participation of stakeholders.

6 CONCLUSIONS

The aim of the presented paper was to offer a bridge from science to policy in order to reach sustainability, while testing this bridge on the basis of case studies in five European countries.

Sustainable development is a global concern dealing basically with the continuity of ecological assets while offering fruitful seedbeds for economic activities strengthening the continuity of both ecological and cultural assets. Both in theory and practice, we recognise the mutual interaction of both global and local actions. But when it comes to modelling sustainability, this interaction is seldom recognised. In addition, the three systems related to sustainability are not even sufficient to obtain sustainable development. All three types of systems need an institutional structure to be

managed by seamless policies. Besides, for human well-being, and the protection and continuity of natural areas as well, a suitable contemporary physical environment is needed.

Within the science-society interaction, academic institutions are only one site of knowledge creation, and sustainability science requires us to do research with, rather than on, policymakers and stakeholders who are pursing sustainable development. Scientists often speak another language than stakeholders and society do, which can make them difficult to understand and may disrupt communication. This was also one of the limitations of our study expressed by the stakeholders involved. Gaps or disagreement between views of scientists and stakeholders are mostly about the prioritization of the main aspects of sustainable development. The most prominent gap is related to the importance of the ecological systems. For scientists, the ecological system is the most important factor for sustainable futures, whereas for stakeholders it is the social system. They rank in particular the awareness of and the participation in sustainability policies, as well as a diverse economic system as very important, while scientists focus more on the quantity and resilience of eco-systems and an effective governance structure.

However, there are also similarities between the opinions of scientists and other stakeholders. Scientists and stakeholders both believe that sustainable futures are a must for their own futures and that of the next generations. Both agree on the relative importance of the institutional system, especially in terms of integration between institutions and policies and the strong continuity in plans and ideas. Furthermore, the physical environment, especially in terms of the quality of infrastructure, the level of technology and innovation, and the level of accessibility by car and public transport, is considered as very important. Furthermore, there exists an overlap in the evaluation of the importance of human capital, openness of society to new ideas and developments and the quantity and quality of ecosystems. This shows that education and skilled labour, the societal understanding and environmentally-benign behaviour are essential.

REFERENCES

Akgün, A.A., E.S. van Leeuwen, P. Nijkamp (2011). A Systemic Perspective on Multi-Stakeholder Sustainable Development Strategies. In: M. Chatterji, D. Gopal, S. Singh, *Governance, Development and Conflict*, 18, 123-146, Emerald, Bingley

Bithas, K., Christofakis, M. (2006). Environmentally Sustainable Cities, Critical Review and Operational Conditions. *Sustainable Development*. 14, 177-189.

Capello R., Nijkamp P., Pepping G. (1999). *Sustainable Cities and Energy Policies*, Springer-Verlag, Berlin.

Carlowitz, C. (1713). *Sylvicultura Oeconomica*, Leipzig: Braunn. Retrieved from Scoones, 2007.

EC (European Commission) (1985). The Official Website about Sustainability. http://ec.europa.eu/environment/eussd/ accessed on 24 July, 2011.

Granovetter, M. (1985). Economic Action and Social Structure: the Problem of Embeddedness. *American Journal of Sociology*, 91 (3), 481-510.

Jenkins, W. 2011. Sustainability Theory. http://www.berkshirepublishing.com/assets_news/sustainability/Spirit_SustainabilityTheory.pdf, accessed at 20.01.2011.

Kates, R.W., Clark, W.C., Corell, R., Hall, J.M., Jaeger, C., Lowe, I., McCarthy, J.J., Schellnhuber, H.-J., Bolin, B., Dickson, N.M., Facheux, S., Gallopin, G.C., Gruebler, A., Huntley, B., J.ager, J., Jodha, N.S., Kasperson, R.E., Mabogunje, A., Matson, P., Mooney, H., Moore III, B., O'Riordan, T., Svedin, U.(2001). Sustainability Science. *Science*. 27(292), 641-642.

Maasen, S. M. Lengwiler., and Guggenheim, M. (2006). Introduction: Practices of Transdisciplinary Research: Close(r) Encounters of Science and Society. *Science and Public Policy*, 33(6), pp.394-398.

Munda, G. (2004). Social Multi-criteria evaluation: Methodological foundations and operational consequences. *European Journal of Operational research*, 158, 662-677.

Nijkamp, P. (2008). XXQ Factors for Sustainable Urban Development: a System Economics View, *Romanian Journal of Regional Science*, 2 (1), 1-34.

Nijkamp, P. and Pepping, G. (1998). A Meta-analytical Evaluation of Sustainable City Initiatives. *Urban Studies*, 35 (9), 1481-1500.

Nijkamp, P. and Yim, H.Y. (2001). Critical Success Factors for Offshore Airports: A Comparative Evaluation. *Journal of Air Transport Management*, 7, 181-188 Nijkamp, P., Vleugel, J., Maggi, R. and Masser, I. (1994). *Missing Transport Networks in Europe*. Aldershot, Avebury.

Pezzey, J.C.V.(2004). Sustainability Policy and Environmental Policy. *Scandinavian Journal of Economics*, 106 (2), 339-359.

Scoones I. (2007). Sustainability. *Development in Practice*, 17 (4/5), 589-596.

World Commission on Environment and Development (WCED), 1987. *Our Common Future*.: Oxford University, Oxford.

Appendix A: List of the Stakeholders by Case Study

Forest companies (MTK)
Forest owners,
Entrepreneurs (also in other sectors that have a connection with the forest sector)
Tourism sector
Policy makers (both administration and political side, ministry of agriculture and forestry and ministry of environment)
Unions
Researchers
Local citizens
Tourists/visitors
Nature organizations
Farmers
Consumers
Agricultural Associations
Local Authorities
Public institutions
Research Institutes
Producers that use the agricultural products as inputs
Environmental NGOs
Political organizations
Community institutions (e.g. Mipaf)
The Ministry of Economy
the Ministry of Public Administration
The Ministry of Environment
The National Agency for Energy Regulation (ANRE)
The National Commission of Nuclear Activity Research (CNCAN)
The Nuclear Power Agency
Energy companies
Consumers
Trade unions
Educational institutions
Marr Area Partnership
Highland Housing Alliance
Housing Trusts and Associations
Estates (Alvie, Rothiemurcus, Glenmore Lodge)
Schools
Cairngorms Hostels
Glenlivet & Cairngorms DMO
Dee Salmon Fisheries Board
Community councils
5 local authorities (Aberdeenshire; Angus, Highland, Moray, Perth & Kinross)
Communities Scotland, Highlands & Islands Enterprise
Scottish Enterprise; Forestry Commission Scotland
Scottish Natural Heritage;
Scottish Water
Scottish Environment Protection Agency;
Deer Commission
VisitScotland
Historic Scotland and University of Highlands & Islands.
Association of Cairngorms Community councils
Cairngorms Chamber of Commerce
National Farmers Union of Scotland
Scottish Rural Property and Business Association
Local interest groups
Visitors and tourists (including 2nd home owners and retirees)
Environment LINK (umbrella of environmental and social justice charities)
Social justice charities for inclusion and Fishery Boards (SRPBA)
Researchers
Catalan Institute of Energy, ICAEN
Department of Economics and Finance
Department of Territorial Policy
Landscape Management department
European Commission
Energy sector (including nuclear energy sector)
Social movements (nature/landscape organisations)
Most important (largest) consumers
Domestic sector

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