How to evaluate environmental policies?

Handout

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Preface:

This handout was created for students of the "*Environmental policy"* course at University of Szeged, Faculty of Economics and Business Administration to help them prepare for their final presentation.

The aim of the Environmental policy course is to provide an introduction into the main concepts of environmental economics and their usage in policy-making. The objective of this handout is to teach students how to use different analytical tools and theoretical models through examples in order to evaluate and form an established opinion about different environmental policies and about the environmental effects of development projects.

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Learning outcomes

a) regarding knowledge, the students

- will have a firm grasp on the essential concepts, facts and theories of environmental economics;
- will be familiar with the complicated relationship between the environment and the economy on a local, regional and global level;
- will also be acquainted with the basic principles of other professional fields connected to environmental policy (engineering, law, environmental protection, quality control, etc.);

b) regarding competencies, the students

- will be able to uncover facts and basic connections, arrange and analyse data systematically, draw conclusions and make critical observations along with preparatory suggestions using the theories and methods learned;
- will be able to make informed decisions in connection with routine and partially unfamiliar issues both in domestic and international settings;
- will follow and understand policy processes on the level of international and world economy along with the changes in the relevant economic policies and laws and their effect. The students will consider the above when conducting analyses, making suggestions and proposing decisions;
- will be able to present professional suggestions and opinions conceptually and theoretically both in written and oral form in Hungarian or in a foreign language according to the rules of professional communication;
- will be professionally prepared to continue their studies in an environmental science and/or ecological economics related master's programme;

c) regarding attitudes, the students

- will be sensitive to the changes occurring to the wider economic and environmental circumstances of their jobs, workplaces or enterprises. Student will try to follow and understand these changes;
- will be accepting of the opinions of others and the values of the given sector, the region, the nation and Europe

(especially social, ecological and sustainability aspects);

d) regarding autonomy, the students
- will take responsibility for their analyses, conclusions and decisions;
- will take responsibility for their work and behaviour from all professional, legal and ethical aspects in connection with keeping the accepted norms and rules;
- will be able to hold lectures and moderate debates independently. The students take part in professional forums (both within the economic institution and outside of it) independently and respectfully;

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Structure of the handout

The handout is divided into two parts. In the first part, conventional environmental policy, in the second part ecological economics based policy is introduced which are the main paradigms of environmental policy-making nowadays. In order to help the acquisition of theoretical knowledge for the students, additional literature and questions for self-check are provided. In both parts, the theoretical introduction is followed by an analytical framework which can be used to evaluate different environmental policies and environmental effects of development projects. Both parts consists of examples for the usage of these frameworks.

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1. Conventional environmental policy

1.1. Main characteristics of the conventional approach:

- Internalization of externalities is the theoretical base.
- Prescriptive, naive.
- Lacks the criticisms of basic structure of current society (free trade, globalization, economic growth, consumer society, capitalism, representative democracy)
- Main instruments: regulations, taxes, market for pollution rights, cost-benefit analysis (CBA)
- Conventional approach assumes that we can achieve social optimum with these instruments.
- They accept the current structure of society and do not try to alter it (or to make it „green").

1.2. The theoretical basics: externalities and internalising

1.2.1.Externalities

Externalities occur if a consumer or a producer is directly affected by the production or consumption of another (third) party.

An externality is an impact that is suffered by a *third party* as a result of an economic transaction. In a transaction, the producer and consumer are the first and second parties while third parties include any individual, organisation, property owner or resource that is indirectly affected.

Externality has an effect on welfare. The affected third party does not pay for the externality. Externalities are unintended.

Examples:

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- The smelting of copper results in SO2 in the air causing acid rain that then damages agriculture, buildings etc.
- SO2 also causes TBC.
- The view of the neighbour's flower garden can improve a person's well-being.
- Smoking can cause different diseases.
- Car use can cause traffic jams that slows down public transport, therefore fewer passengers will use public transport.

Different types of externalities (1):

Effects	Consumer	Producer
Positive	Vaccination	Beekeeper and the orchard
Negative	Radio in a public park	Noise pollution during production process

Types of externalities (2):

Technological externalities are the result of using a certain technology, for instance SO2 from the technology of copper smelting. Financial externalities have an effect on income or wealth. Externalities can affect public goods (for instance air pollution) or private goods (for instance garbage on someone's field). Externalities can be reversible or irreversible.

1.2.2. Economic consequences of externalities

Normally, producers do not have any incentives to reduce pollution, to re-use or to recycle. For instance, there is no incentive for producers to compost the organic waste because traditional trash cans are easier and cheaper to use. But externalities

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cause damage to the environment and therefore cause additional costs to society (external costs).

The social cost (=external costs + private costs) of a market activity is not covered by the private cost (producers' costs of providing goods and services) of the activity.

Economic externalities will result in the demand for a given product becoming too high with an exceedingly low price relative to the social optimum. Thus, the income coming from the sale of the given product does not cover the social costs of externalities. With other words: nobody pays for the costs of externalities.

According to neoclassical economics, there is an optimal level of pollution. We don't have to stop pollution, just find the optimal level of it. We have to find the balance between production and pollution. In order to find the optimal level of pollution, we have to ***internalise*** the costs of pollution.

1.2.3.Basic logic of internalising

1. The producer has to pay for pollution (for example: has to pay the costs of cleaning or green taxes). Then the costs of pollution are internalised into the market.
2. The producer will raise its prices.
3. Demand on the market will decrease.
4. Production will be reduced to the optimal level.

(Without internalising: too high levels of production and too low prices)

We have to internalize external costs into the market otherwise prices will be lower and production will be higher than the optimal and the consequence is welfare loss for society.

1.3. Pollution chain and environmental policy

Economic activity (industry, agriculture etc.)

▼

Emission (Depends on activity and structure. It can be solid, liquid, gas, waste etc.)

▼

Imission (State of the environment, phenomena depending on social and environmental circumstances, like acid rain, ozone hole, global warming)

▼

Impact (Impact on human or nun-human health, like disease, extinction)

▼

Impact assessment (Environmental policy)

Based on the different levels of the pollution chain, there are different categories of environmental policy:

- **Healing** environmental policy – reaction, alleviating the impacts.
- **Impact-oriented** environmental policy– effect on imission and not on emission. Improve the quality of the environment (dump-sites, by-pass roads, etc).
- **Source-oriented** environmental policy – reducing emission, „end of pipe" techniques. Restrictions, sanctions, prohibitions like filters on chimneys.
- **Preventive** environmental policy – latest, effective (?) Helps to change technology.

1.4. Principles of environmental policy

- PPP – Polluter Pays Principle / OECD, 1972/ Worldwide accepted principle. It is an incentive to reduce pollution.
- P(U)PP – Polluter and User Pays Principle
- Precautionary principle /EU/
- Preventive principle /Rio de Janeiro, 1992/

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- Cost effectiveness principle
- Subsidiarity principle. Decisions should be made at the lowest possible level of decision-making.
- Principle of shared responsibility. Society as a whole is responsible for pollution.
- Integrated Pollution Prevention Control, IPPC
- Principle of integrated avoidance and reduction of environmental pollution /EU, 1993/
- Directive on public access to environmental information

1.5. Criterions to choose environmental policy instruments

- **Static efficiency** – „end of pipe" (Short term efficiency, reducing the costs of emission)
- **Dynamic efficiency** (Long term efficiency, using better technology)
- **Information needs** (How much information is needed to asses or to monitor the given policy instrument?)
- **Adaptation to changes** (How can the policy adapt to environmental and social changes like oil prices or inflation?)
- **Political considerations** (What is the impact on social distribution, employment etc.?)

1.6. Instruments of conventional environmental policy

1. Normative regulations based on direct intervention
2. Indirect or economic regulation based on incitement
3. Instruments based on providing information

1.6.1. Normative regulations based on direct intervention

Based on restrictions and prohibitions → Restrict or prevent environmentally harmful activities.

Norms

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Aim → define environmental goals, critical impacts. Typically influenced by politics and society

Criteria→ define technical parameters

Emission norms: Allowable emission for a source of pollution**.** Stage of relief for pollution. Sometimes it means prescribed best practice (for instance using a certain type of technology).

Sometimes prescribed maximum concentrations of pollutants (on emission).

Prohibition of emissions tied to concentration/costs of damage.

Restriction of emission based on input/output if there is a direct connection between input and pollution.

Imission norms → typically defined by natural science

Direct prohibition

Direct prohibition of using certain technologies or materials. For instance prohibition of DDT.

Approval process (licence)

The economic activity is connected to an approval process.

Controlling

Institutional control of the activity.

Sanctions

Legal sanctions to deter the wrong practices.

Disadvantages of direct regulations:

- Defining norms
- Costs of administration
- Social acceptance (for instance: changing norms)

- Cost-effectiveness?
- Pollution under the norm is free
- Norms are not internationally coordinated

1.6.2. Indirect or economic regulation based on incitement

The aim of indirect or economic regulations is to influence economic interests and change the economic environment.

Tax, charges

Sometimes taxes are more efficient than norms. But in practice, it is not based on the optimal size of the tax (we do not know it), therefore it is problematic.

Subvention

- Dotation
- Tax relief
- Government loan, reduced interest rates.

Deposit-refund system

The deposit-refund system is a surcharge on a product when purchased and a rebate when it is returned. It can be used effectively if:

- the number of pollution sources are high,
- the sources are mobile,
- the exact cause of the pollution cannot be clearly detected.

Market for pollution rights

1970: Clean Air Act

Imission norms → show the allowed level of pollution

Imission norms → emission norms →
sale of pollution rights

Elements:

- Emission reduction credits (ERC)
- Emission offset (clean development mechanism)
- Bubbles policy, Cap-and-trade
- Netting out

1.6.3. Instruments based on providing information

The aim is to provide the necessary information about environmental impact. Examples:

- Awards and acknowledgements
- Inform and educate society
- Life-cycle analysis (LCA)
- Environmental report
- Environmental audit, management system
- Product labelling
- Negotiated agreements

1.7. Production and consumption from a spatial perspective – IPAT –formula

$$I = P \cdot A \cdot T_1 \cdot T_2 \cdot T_3$$

I: human impact

P: population

A: affluence (economic performance per capita)

T: technology (environmental impact per capita)

$\mathbf{T_1}$: environmentally friendly technologies

T_2: structure of the economy

T_3: spatial patterns of the economy

Which one is disputed in conventional economics?

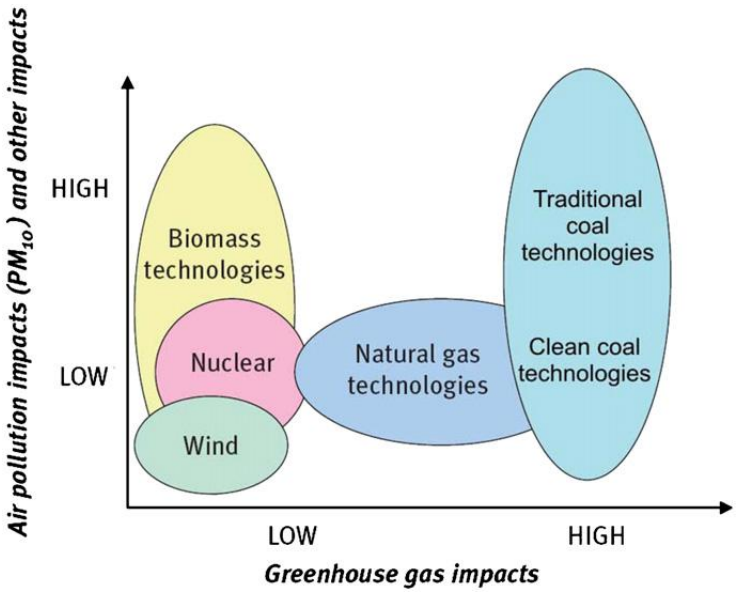
1.8. Analytical framework: cost-benefit analysis (CBA)

If benefits > costs → winners can compensate the losers.

It is used to evaluate policy options. For instance: choosing between energy supply options, environmental regulations or motorway-building.

1.8.1. External costs in CBA

Usually external costs in CBA are expressed in monetary parameters (Laes et al. 2011).



- Both renewables and nuclear power show very limited external

costs (generally 1 h/MWhe), with the exception of some biomass technologies;

- Gas technologies have an intermediate external cost (generally in the range of 10–30 h/MWhe);
- Traditional oil and coal technologies fall generally within the high range of external costs (30–150 h/MWhe)

1.8.2.Limits to the value of external costs and CBA

The distribution of environmental effects

Spatial distribution → Costs and benefits don't occur in the same area, therefore aggregated external costs do not show the spatial distribution of external costs. What about effects outside the border? What about polluting industries in developing countries?

Balance of benefits and burdens → To what extent is the social distribution of the environmental burdens caused by each option balanced by the distribution of the associated benefits? Identities of particular exposed individuals or communities are lost. For instance: for a given volume of electricity production, the impacts of a number of small dispersed generating units may match the distribution of benefits of the electricity produced more closely than the impact of one single large power station located in a rural area.

Fairness → Distribution of burdens and benefits across nations, communities, classes, races, genders, ages and cultural, political or economic interests groups? Irrespective of the degree of balance in the distribution of burdens and benefits, questions may remain concerning the extent to which the distribution of burdens imposed by the different options acts to alleviate or compound pre-existing patterns of privilege or social disadvantage?

Intergenerational justice → Who cares about the preferences of future generations? In CBA there is often a problem about discounting: how to calculate discount rate?

Human or non-human → The degree to which different environmental burdens affect the well-being of human or non-human organisms. This is one of the central ethical themes in modern environmentalism.

Forms of environmental effects

Severity → Aggregated numerical values for risks fail to convey important information concerning this question of the severity of the effects of the different

options. Morbidity = risk of getting sick, mortality = risk of dying. It is hard to compare morbidity and mortality. Which one is better: Project 1: 30% morbidity and 1% mortality or Project 2: 15% morbidity and 2% mortality? There is a subjective value judgement about how much illness is equal to one death.

Immediacy → Are the effects associated with each option all manifest themselves immediately or do they differ in their degree of latency between the initial commitment of a burden and the eventual realisation of an effect? An example is the contrast between injury and disease. Injury is an acute, immediate effect and disease can be a latent, later realised consequence.

Gravity → The risks associated with some options are dominated by low probabilities of large impacts, while those of other options may be characterised predominantly as high probabilities of low impacts.

Reversibility →Different options are not equally reversible. For instance, the accident and nuclear waste management risks associated with nuclear power and the climatic effects associated with fossil fuel combustion are all effectively irreversible after the decommissioning of a plant. By contrast with this, the landscape, occupational health and even ecological risks associated with options such as wind or wave power are all relatively reversible after a plant is removed.

The autonomy of those affected

Voluntariness → Different effects differ in degree to which exposure may be considered to be voluntary prior to the commitment of an impact. The installation risks presented by do-it-yourself thermal insulation measures in the home are more voluntarily undertaken by those who stand at risk than are the health risk associated with atmospheric discharges from fossil-fuel power plants.

Controllability → Impacts associated with different options are not all equally controllable from the point of view of the individuals or communities.

Familiarity → Different options differ in terms of their familiarity to individuals, communities and institutions in society. For instance: the genetic effects associated with elevated exposures to ionising radiation are less familiar in kind than are the traffic accident risks associated with the transport of biomass.

Trust → The degree of trust enjoyed by those responsible for imposing a risk.

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„If the public cannot evaluate the risk, they will evaluate the regulator."

The choice of indicators

Quantifiability→ Effects associated with different options may not all be equally quantifiable (for instance aesthetic effects). It is hard to avoid a disproportionate emphasis on the more quantifiable aspects.

Fidelity: How well does each disaggregated performance indicator resolve the full character and scope of the individual effect? Many environmental and human health effects display discontinuous or more complex dose-response relationships.

Treatment of uncertainty

Ignorance → Risk versus pure uncertainty. There may exist factors which lie entirely outside the boundaries of analysis.

Data quality → The quality of the theory or data is often problematic.

Causal complexity → Complex causal mechanisms that are hard to investigate. For instance: pollution is accumulating, different sources affect each other.

Framing and presentation of appraisal

Specificity → The results will be dependent on methodological assumptions. There are no value-neutral methodologies, every method has its own bias, thus it is impossible to cover all the information. We have to be aware of the different biases of the methods, the results will depend on the chosen methodology.

Trajectories →A significant source of confusion and controversy in the interpretation of environmental appraisal results surrounds assumptions concerning the trajectories (or rates of change) the relative performance of different options. How fast is technology developing? → subjective

System boundaries → Assumptions concerning the boundaries of the technical systems under appraisal are often far from obvious and yet can have a critical influence on the results.

Articulation → Recommendations are often made as to the implications for industrial strategy or public policy.

Summary: several problems of external costs and CBA

- Distribution → in society, in space, between generations… etc.
- Reductionism → monetary terms
- Uncertainty → monetary values are often accidental
- Manipulation → distorting the results

1.8.3. Principles to use CBA in environmental policy

- CBA is a **useful way of organizing a comparison** of the favourable and unfavourable effects of proposed policies. BUT: where uncertainty is too high, CBA shouldn't be the only and decisive tool.
- **Decision makers should not be precluded** from considering the economic benefits and costs of different policies.
- CBA should be required **for all major regulatory decisions**.
- Agencies should not be bound by a strict CBA, but should be required to **consider available CBAs**. For regulations whose expected costs far exceed expected benefits, agency heads should be required to present a clear explanation justifying the reasons for their decision.
- Benefits and costs of proposed policies should be **quantified wherever possible**. Best estimates should be presented along with a description of the uncertainties.
- Quantitative factors should not dominate on **qualitative factors**.
- Values used for monetizing benefits and costs are those of the **affected individuals**, not the values held by economists, moral philosophers, or others.
- The more **external review** regulatory analyses receive, the better they are likely to be.
- A core set of economics assumptions should be used in calculating benefits and costs associated with **environmental, health and safety regulation**. Key variables include the social discount rate, the value of reducing risks of dying and

accidents, and the value associated with other improvements in health.

- A good CBA will identify important **distributional consequences** of a policy.

1.9. An example of CBA:

Water power plant (USA, Middle Snake River) (Hines 1973)

Results: Green light, the power plant was built.

Benefits: electricity supply, workplace, income (They expected rise in electricity demand).

Costs: biodiversity loss (rare animals), aesthetic consequences (They are not (hardly) quantifiable).

Uncertainties: 1973 and 1979 rise of oil prices → lower demand of electricity.

1.10. About conventional instruments in general

Huge topic, debate in literature about: emission trading, environmental taxes, environmental reports, auditing, environmental management systems, awards, LCA.

Conventional instruments prescribe what we should do but don't examine the reality: how this could be realized in political decision-making. For instance: can we win an election with green taxes?

Don't criticise the current structure of society. What is sustainable?

- …free trade?
- … globalization?
- …economic growth?
- …consumerism?
- …capitalism?
- …representative democracy?

Mainstream in nowadays' environmental policy. Conventional because it's not critical. Several

instruments with heavy debates around them.

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1.12. Questions for self-check:

- What are the elements of the pollution chain?
- What are the types of environmental policy according to the pollution chain?
- What are the principles of environmental policy? Give at least three examples!
- What is static efficiency?

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- What is dynamic efficiency?
- What is the main aim of normative regulations?
- What are the typical normative regulations?
- What is the main aim of indirect or economic regulations based on incitement?
- What are the typical forms of indirect regulations?
- Give an example for an instrument based on providing information!
- What are the main characteristics of the conventional approach in environmental policy?
- What do we use cost-benefit analysis for?
- What are the limits of external costs and CBA? Describe at least three problems!
- What are the principles to use CBA? Give at least three examples!

2. Environmental policy from an ecological economics perspective

Ecological economics is critical to conventional environmental economics. Authors of ecological economics state that the scope of conventional instruments is too narrow, the environment is valuable in itself independently from its role in the production process. Environmental, social and economical processes cannot be separated and must be evaluated together. That is why human well-being and decision-making is central for an environmental policy evaluation.

2.1.Human well-being perspective

Theoretical background: capability approach

The capability approach is about the real *opportunity* to live a life we have good reason to value. One of the most important notions of the capability approach is “functioning”. Functionings are the “doings and beings” of life that a person has reason to value. These can be very simple things like being well-
nourished, healthy, or being able to move.
They can also be more complex ones like

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being educated, taking part in community life or having self-respect.

The notion of "capability" refers to the available real opportunities (functionings) of individuals in the sense that the given individual has both the means *and* the ability to convert them into things he has a reason to value. Capabilities in this way are a set of functionings that a person can actually achieve in society. The achieved functionings are not equivalent to the well-being of a person or society because opportunities that could be but are actually not chosen may be valued as well.

Carrying out evaluations in the space of capabilities has several advantages compared to other approaches. First, the obvious advantage of the capability approach is that it inevitably makes us realize the necessity of value-choices by making them explicit. In the evaluation process the community has to specify the set of valuable functionings and their relative importance. In Sen's view, this designation must happen through reasoned, social scrutiny (through deliberative processes). Therefore, in this approach, it is obvious that the evaluation cannot be carried out without open public debates (by external observers).

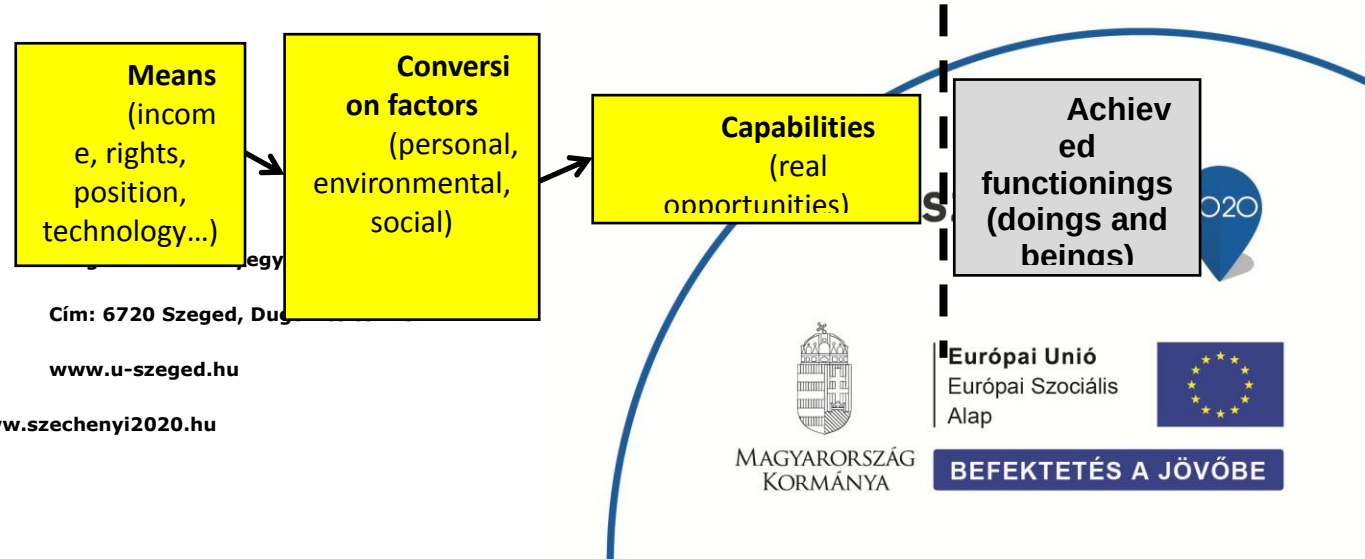
Furthermore, Sen also points out that when we choose capabilities as the informational basis of evaluation *participation and deliberation become valuable per se* and not only as means. Open public debates can be valued even when we do not actually participate in them.

The second advantage of the capability approach is that its informational basis may be able to embrace the missing elements of the conventional approaches. In the capability approach, a policy maker has to give attention to freedoms and rights, to circumstances of achieving goals and has to scrutinize the possible social goals instead of simply accepting them as implicit presumptions.

Summary:

- Capability: real opportunity to live a life we have good reasons to value
- Functionings, doings and beings (being educated, riding a bicycle etc.)
- The real opportunity to achieve functionings: capability
- Public participation, deliberation

Figure 1. The elements of the capability approach



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Framework for evaluation:

1. What are the means?
2. How can people ***use*** their means?
    1. What are the *available* opportunities, capabilities?
    2. What is not available?
    3. What is hindering people? What are the conversion factors?

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2.2. Decision-making perspective

Theoretical background from the capability approach

- **Public participation:** directly taking part in social decision-making
- **Deliberation:** an opportunity to discuss ideas, persuade, being persuaded

Analytical tool: power cube

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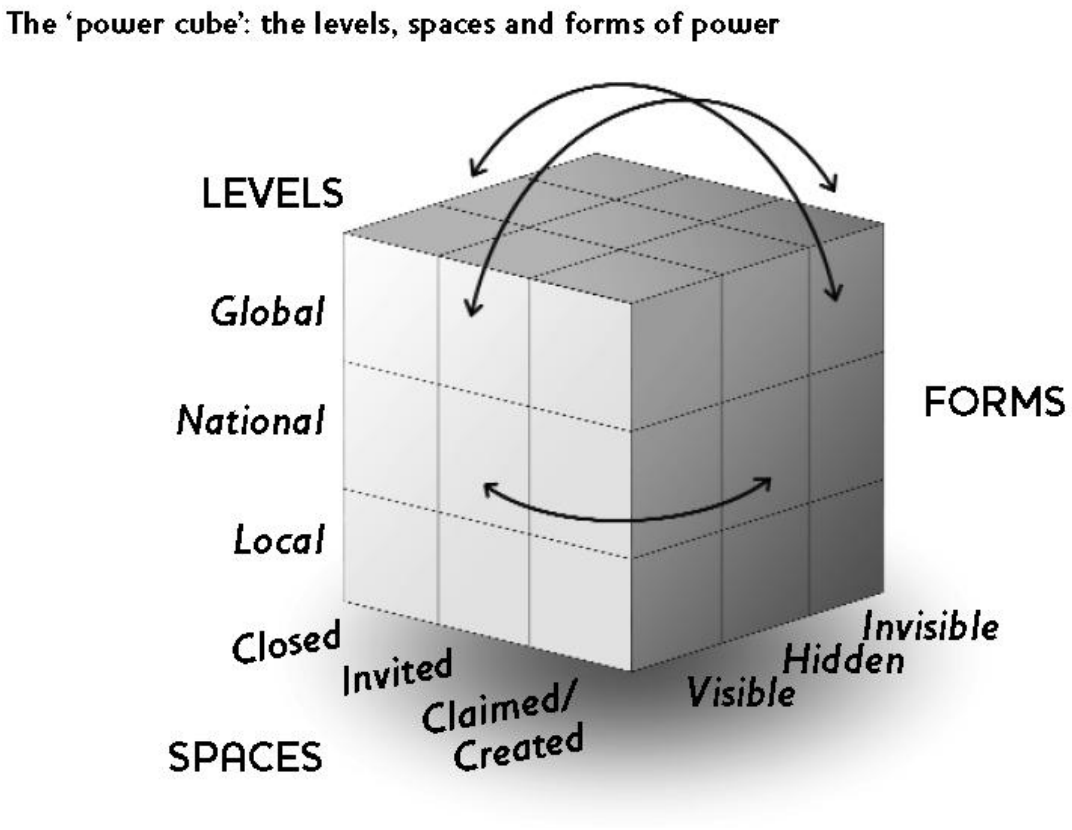
Who has the capacity (power) to participate effectively in decision-making?

Figure 2. Power cube



Source: Gaventa 2006.

Spaces of power are the opportunities or channels through which citizens can act in order to influence decisions, discourses and relationships in their life. Spaces of power are not fixed. They are dynamically

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changing, human made instruments for using power. There are three different kinds of spaces in the power cube: closed, invited and claimed spaces. A *closed space* is a space of decision-making in which a closed group makes the most important decisions behind closed doors without involving any other actors into the process. For instance, a city council can be a closed space, if it does not invite any other stakeholders into the decision-making process. Part of civil society works in order to disrupt or open up these spaces and to ensure publicity and transparency. *Invited space* means that the main decision-making institution invites other actors – individuals or organizations – into the process. Invited spaces usually have some kind of organized form, like a residential forum. *Claimed spaces* are those spaces of power that are claimed by less powerful groups of the society. It means that they gained their space in decision-making. People with similar values and mind-sets but without power join forces to achieve a common goal. Those spaces can be manifold: from social movements through founding non-governmental organisations (NGOs) to community spaces like a local pub where people discuss certain issues.

The second dimension of the power cube is the ***forms of power***. On the basis of its manifestations it differentiates between visible, hidden and invisible forms. *Visible power* denotes the observable and defined form of power (e.g. formal rules, structures; authorities, institution and other official mechanism of decision-making). *Hidden power* means the capacity to influence the agenda of decision-making. Power is not just a capacity to make a decision in a case but also to prevent the case from arising as a problem at all. Generally, less influential groups are left out because of the mechanisms of hidden power. *Invisible power* refers to the capacity to determine the psychological or ideological boundaries of political participation and to influence the interpretations of problems and the norms of overall acceptance. Sometimes, serious problems are missing not just from the political agenda but also from the perceptions of the stakeholders. These channels affect how people think about their position in the world and what they believe to be acceptable.

The third dimension of the power cube is the ***levels of power*** which can be local, national or global. In the literature, there are arguments for initiating political participation at the local level but others claim that participating at the global level is inevitable because nowadays power is concentrated in the hands of global actors. Nevertheless, in case of evaluating local development projects, the local level always plays a vital role.

Analytical framework, questions to ask:

- Who are the different actors (individuals, groups, institutions etc.) in the different sub-cubes of the power cube?

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- Who are in the closed spaces, invited spaces or claimed spaces?
- Who have visible power, hidden power or invisible power?

An example of the power cube (Gébert et al. 2017)

Analysing three cases with the evaluative framework: (1) the building of a shopping mall, (2) the building of a water park and spa, and (3) the rebuilding of a marketplace. All the three cases are located in Szeged, a middle-sized city in Hungary, a regional centre with 161 000 inhabitants. The analysis was conducted via interviews and analysing methods.

		Shopping mall	**Water park and spa**	**Marketplace**
Agency	**Closed spaces**	City council, Investors	City council, Investors	City council, Head of the project-company, Regional authorities
	Invited spaces	Architects, Designers, Local media	Architects, Designers, Real estate experts, Water management experts	Staff of the local government, Architects, designers, Merchants
	Claimed spaces	Civil collaboration for the hemp-spinning factory building, Petition of the retailers in city centre.	Signature collecting by a local NGO, Official prosecution, NGO's protests and press conferences.	Civil suits of the owners of kiosks and stalls, Signature collection by a local NGO.
Values made explicit		Efficiency and income growth versus preserving cultural heritage, Taking responsibility for	Income generation versus providing cheap services to local	Importance of primary producers versus importance of retailers

	those falling behind in the market	inhabitants	

2.3. Questions for self-check:

- What do “capabilities” mean in the capability approach?
- Why is deliberation important?
- What are the forms of power in the power cube?
- What is the difference between public participation and deliberation?

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