Literature review on fundamental concepts and definitions, objectives and policy goals as well as instruments relevant for socio-ecological transition

Working Paper no 40

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Socio-economic Sciences and Humanities Europe moving towards a new path of economic growth and social development - Collaborative project

Literature review on fundamental concepts and definitions, objectives and policy goals as well as instruments relevant for socio-ecological transition

Anna Dimitrova, Katarina Hollan, Daphne Laster, Andreas Reinstaller, Margit Schratzenstaller, Ewald Walterskirchen, Teresa Weiss (WIFO)

Abstract

The research project WWWforEurope undertakes to lie the theoretical and empirical foundations for the embarkment on a new socio-ecological growth path in Europe. The new path underlines the need to guarantee Welfare as a broad universal principle for its population, assuring economic and social prosperity. The new path stresses the value of achieving – what we call – Wealth, a value in which material and immaterial resources are combined with the goal to enrich people's lives and to preserve natural resources, nature and bio-diversity. Both cannot be achieved without Work: Europe needs to enable its population to achieve their life satisfaction at the highest level possible and Work is one of the most – if not, the most – fundamental precondition for this. In short, the overarching question the WWWforEurope project attempts to answer is what kind of new European growth and development strategy is necessary and feasible, enabling a socio-ecological transition to high levels of employment, well-being of its citizens, social inclusion, resilience of ecological systems and a significant contribution to the global common goods like climate stability.

Thus the project's central goals are to identify the forces and challenges necessitating deliberations on a new growth path, to define socio-ecological transition, key actors and main obstacles, and to find out how the process of a socio-ecological transition can be initiated, monitored, and accelerated on an institutional level (EU, national and regional level). A central prerequisite to successfully accomplish these central goals is to establish a common understanding of the central questions raised by this undertaking and to create awareness for the project's systemic and interdisciplinary approach. To this behalf, this paper presents fundamental concepts, terms and definitions relevant for socio-ecological transition. Hereby the paper focuses on the concepts of sustainability, growth, innovation, welfare and well-being, wealth and work. We also look at the various dimensions and definitions of transition/transformation which can be found in the literature, trying to concretise the concept of a socio-ecological transition forming the context and starting point of the WWWforEurope project.

The necessity to accomplish a socio-ecological transition represents the starting point and the background against which the concepts and terms addressed in this paper gain their relevance. Economic, environmental and social sustainability and sustainable growth and development,

respectively, are the central and final aim of the envisaged socio-ecological transition. Sustainability is an indispensable precondition for societal and individual welfare/well-being. Socio-ecological transition to achieve sustainability requires putting into question the prevailing view on economic growth. While economic growth may help to reduce poverty or unemployment and may thus be positively related with social sustainability, this often implies negative external effects for the environment. Alternative growth concepts are to be explored therefore, which do not consider the economic dimension of sustainability only, but explicitly try to incorporate social and environmental aspects in addition. Several more sustainability-oriented growth concepts have been brought into the discussion more recently. All of them are departing from the empirical fact that with increasing levels of GDP per capita the relation between economic growth and societal as well as individual well-being is weakening and that economic growth on the contrary may even endanger environmental and social sustainability (e.g. due to too little time for family and friends) and thus negatively affect quality of life and well-being. A more sustainable perspective on growth requires a more sustainable view on innovation, as a central driver for growth. Within the context of a socio-ecological transition based on sustainable growth, ecological and social innovation gain in importance vis-à-vis purely profit-oriented innovation. Long-term growth is based on wealth as the productive base of an economy. Sustainable growth and development needs to rest on a comprehensive/inclusive wealth concept taking into account, besides the conventional material assets, also natural capital. Finally, socio-ecological transition will also affect the organisation of work/labour.

This paper tries to define and concretise these fundamental concepts and terms. Thus it should provide some kind of lexicon, which serves as starting point and background for the work on the central questions guiding the WWWforEurope project. Wherever possible, the paper should facilitate the agreement on common definitions. It is not the aim of the paper to elaborate trade-offs in depth and to offer solutions and answers already. It rather strives to motivate all research groups involved in the WWWforEurope project to use and discuss the existing concepts, may they be consistent or just offer a variety of thought. It also attempts at drawing attention to the existence of trade-offs and open questions relevant for the various research areas. Moreover, the paper wants to inspire the search for best (or the identification of not working) practices, and it wants to increase the awareness for existing barriers to change. While the paper is not able to elaborate in depth distributional and gender aspects as crucial cross-cutting issues, it aims at directing attention at them and at inspiring research undertaken in the WWWforEurope project to consider these cross-cutting issues. Finally, the paper does not focus too much on policy issues. It is the aim of the overall project to identify (potential) interlinkages, trade-offs and synergies and to discuss policy options and instruments in details to support a more dynamic, inclusive and ecological growth and development path for Europe.

Contribution to the Project

The literature review defines important concepts for the work of Areas 1 to 6. The work of this milestone contributes to a deeper understanding of the issues relevant within each Area as well as the cross-cutting issues affecting all Areas.

Keywords: Behavioural economics, beyond GDP, biophysical constraints, ecological innovation, economic growth path, gender, innovation, social innovation, socio-ecological transition, sustainable growth, synergies, wealth

Jel codes: D6, E02, E61, H11, H51, H52, H53, H54, H55, I31, J11, J16, L16, O31, O43, O44, R11, Q20, Q40, Q50, Q51, Q58

1. Introduction and Motivation

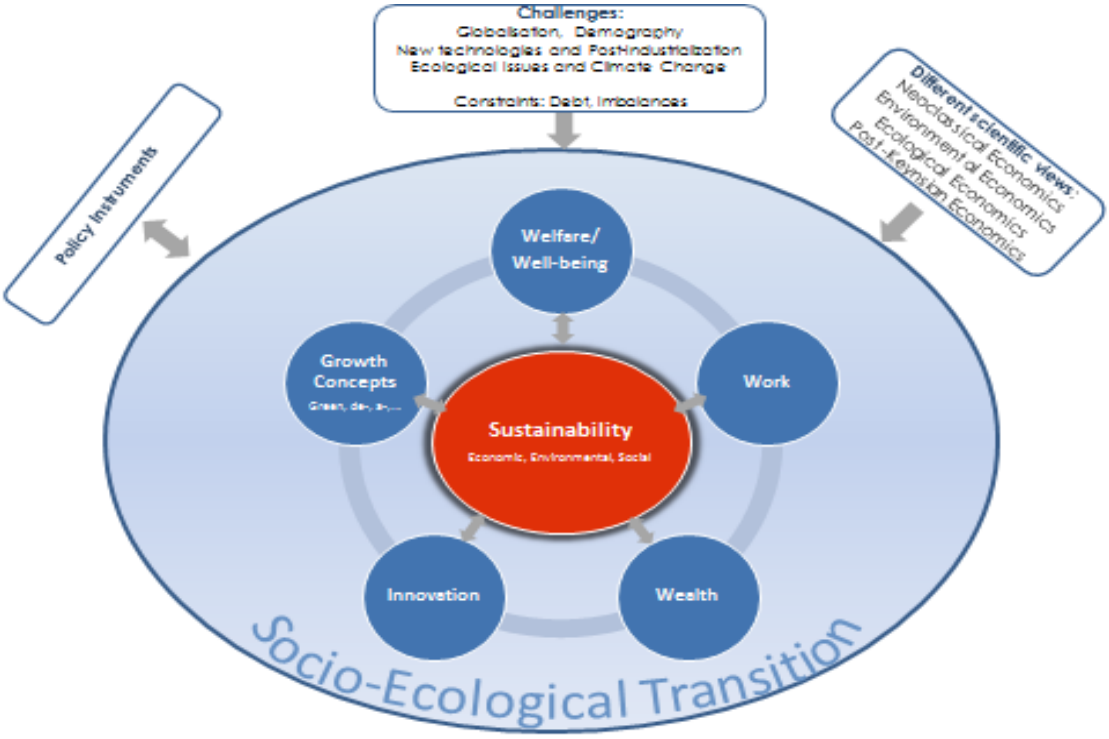
The research project WWWforEurope undertakes to lie the theoretical and empirical foundations for the embarkment on a new socio-ecological growth path in Europe. The new path underlines the need to guarantee Welfare as a broad universal principle for its population, assuring economic and social prosperity. The new path stresses the value of achieving – what we call – Wealth, a value in which material and immaterial resources are combined with the goal to enrich people‘s lives and to preserve natural resources, nature and bio-diversity. Both cannot be achieved without Work: Europe needs to enable its population to achieve their life satisfaction at the highest level possible and Work is one of the most – if not, the most – fundamental precondition for this. In short, the overarching question the WWWforEurope project attempts to answer is what kind of new European growth and development strategy is necessary and feasible, enabling a socio-ecological transition to high levels of employment, well-being of its citizens, social inclusion, resilience of ecological systems and a significant contribution to the global common goods like climate stability. This overarching question can be broken down in five central questions guiding project work:

1. Can the EU at the same time participate more strongly in world growth, guarantee a maximum well-being of its population and reduce energy and material input?
2. How can regional cohesion and social inclusion be achieved in such a growth strategy minimising risks of detrimental effects on incentives and maintaining the openness of society?
3. How can social and technological innovations be supported (and the focus of technological trends be shifted) so that they contribute to social and ecological sustainability?
4. How can institutions of modern market economies be changed so as to internalise the current social and ecological externalities and to decrease volatility and divergence in Europe?
5. How can the general public, third sector actors and vested interests be motivated to support reforms towards a new growth path?

Thus the project’s central goals are to identify the forces and challenges necessitating deliberations on a new growth path, to define socio-ecological transition, key actors and main obstacles, and to find out how the process of a socio-ecological transition can be initiated, monitored, and accelerated on an institutional level (EU, national and regional level). A central prerequisite to successfully accomplish these central goals is to establish a common understanding of the central questions raised by this undertaking and to create awareness for the project’s systemic and interdisciplinary approach. To this behalf, this paper presents fundamental concepts, terms and definitions relevant for socio-ecological transition. Hereby the paper focuses on the concepts of sustainability, growth, innovation, welfare and well-being, wealth and work. We also look at the various dimensions and definitions of transition/transformation which can be found in the literature, trying to concretise the concept of a socio-ecological transition forming the context and starting point of the WWWforEurope project. As far as possible at this first stage of the project, we try to detect and make explicit the interrelations between the fundamental terms and concepts presented and also consider equity/distributional aspects and gender issues as cross-cutting issues relevant for basically all concepts and terms the paper addresses.

Figure 1 offers a graphical illustration of the fundamental concepts and terms relevant in the context of the WWWforEurope project.

Figure 1: Concepts and Contexts of the WWWforEurope Project in a Nutshell



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Starting point for deliberations about necessity and options of a socio-ecological transition are the challenges Europe is facing. Globalisation shifts economic power to Asia, brings about additional low-cost competition and calls for a new world-wide division of labour. New technologies and post-industrialisation create new opportunities, but also change existing production modes and consumption patterns. Natural resources are limited and become ever more expensive; climate change has become a global reality which demands quick and decisive action. The ageing of society will shift consumption and work patterns, it decreases labour supply and calls for immigration (which is manageable, but may put the existing political and social consensus under increasing strain). Income distribution is becoming more unequal within countries and between regions. Public debt and (macroeconomic) imbalances represent challenges and constraints for policy-makers at the same time. Fiscal deficits and public debt are high, while costs of health, pensions and long-term care are rising in the long run and endanger the rather generous – albeit different across countries – European welfare systems. Macroeconomic disequilibria are large across countries, and destabilising forces from the financial markets are hitting Europe harder, although public deficits are lower than in the US and Japan.

Thus challenges as well as constraints for Europe are severe. To some extent, they are even more demanding than for other regions: the projected demographic change will be larger than in the US, globalisation will be more challenging due to high wages and social costs. And the challenges will likely intensify in the future: energy consumption is still rising and resource scarcity becomes more pressing, social and health costs tend to grow over-proportionately and imply additional strain on public budgets. The recent financial crisis has reinforced the view in the public debate that Europe is in need of a new growth path, by revealing old, lingering

problems as well as demonstrating the instability of the current growth path, and aggravating unemployment and public debt. Europe is not recovering from the crisis as fast as other regions, with slow economic growth and unemployment persisting.

Figure 1 also draws attention to the fact that different scientific views and schools of thought influence the identification and assessment of the most pressing problems, challenges and constraints for Europe, the definition and interpretation of the fundamental terms and concepts relevant for a socio-ecological transition, as well as the assessment and choice of policy instruments. In the context of a socio-ecological transition the existing scientific views do not only comprise the traditional and well-established different perspectives of neoclassical and (Post-) Keynesian economics. Additionally, ecological and environmental economics with their respective paradigmatic frameworks bring in differing sets of assumptions and methodological approaches. Therefore analytical and empirical approaches and results may well differ between the individual scientific paradigms, as will the policy recommendations derived on their basis. Moreover, the assessment of different policy options and policy instruments as well as instrument choice depend on the respective scientific view.

The core of figure 1 consists of the fundamental concepts and terms in the context of a socio-ecological transition, which are connected by manifold interrelations. The necessity to accomplish a socio-ecological transition represents the starting point and the background against which the concepts and terms addressed in this paper gain their relevance. Economic, environmental and social sustainability and sustainable growth and development, respectively, are the central and final aim of the envisaged socio-ecological transition. Sustainability is an indispensable precondition for societal and individual welfare/well-being. Socio-ecological transition to achieve sustainability requires putting into question the prevailing view on economic growth. While economic growth may help to reduce poverty or unemployment and may thus be positively related with social sustainability, this often implies negative external effects for the environment. Alternative growth concepts are to be explored therefore, which do not consider the economic dimension of sustainability only, but explicitly try to incorporate social and environmental aspects in addition. Several more sustainability-oriented growth concepts have been brought into the discussion more recently. All of them are departing from the empirical fact that with increasing levels of GDP per capita the relation between economic growth and societal as well as individual well-being is weakening and that economic growth on the contrary may even endanger environmental and social sustainability (e.g. due to too little time for family and friends) and thus negatively affect quality of life and well-being. A more sustainable perspective on growth requires a more sustainable view on innovation, as a central driver for growth. Within the context of a socio-ecological transition based on sustainable growth, ecological and social innovation gain in importance vis-à-vis purely profit-oriented innovation. Long-term growth is based on wealth as the productive base of an economy. Sustainable growth and development needs to rest on a comprehensive/inclusive wealth concept taking into account, besides the conventional material assets, also natural capital. Finally, socio-ecological transition will also affect the organisation of work/labour (Fischer-Kowalski, et al., 2012)

This paper tries to define and concretise these fundamental concepts and terms. Thus it should provide some kind of lexicon, which serves as starting point and background for the work on the central questions guiding the WWWforEurope project. Wherever possible, the paper should facilitate the agreement on common definitions. It is not the aim of the paper to elaborate trade-offs in depth and to offer solutions and answers already. It rather strives to motivate all research groups involved in the WWWforEurope project to use and discuss the existing concepts, may they be consistent or just offer a variety of thought. It also attempts at drawing attention to the existence of trade-offs and open questions relevant for the various research areas. Moreover, the paper wants to inspire the search for best (or the identification of not working) practices, and it wants to increase the awareness for existing barriers to change. While the paper is not able to elaborate in depth distributional and gender aspects as crucial cross-cutting issues, it aims at directing attention at them and at inspiring research undertaken in the WWWforEurope project

to consider these cross-cutting issues. Finally, the paper does not focus too much on policy issues. It is the aim of the overall project to identify (potential) interlinkages, trade-offs and synergies and to discuss policy options and instruments in details to support a more dynamic, inclusive and ecological growth and development path for Europe.

2. Concepts and Contexts of the WWWforEurope Project in a Nutshell

2.1 Socio-ecological Transition

Persistent problems like climate change, demographic challenges, unemployment, loss of biodiversity, environmental pollution, and recurrent economic crises which present formidable societal challenges are the starting point thinking about necessary transitions of the current societal system. Most of these problems are inherent in the complex system structure of a society where many subsystems (in particular the economic system, the energy system, the technological system, and the political system) are interlinked with each other and influence each other. However, changes in system structures are often related to trade-offs between the different objectives of the various sub-systems (for example: growth-sustainability conflict, social well-being and employment versus protecting the environment). It becomes obvious that a change in the system structure of the European Union towards a more economically, socially and ecologically sustainable system cannot be achieved by isolated and non-systemic policy measures but requires an underlying "socio-ecological" transition concept. So far, some transition approaches mention the term socio-ecological transition (see Fischer-Kowalski and Haberl, 2007 or Rotmans, Kemp, and van Asselt, 2001), but there seems to be no broadly accepted definition in the literature.[1]

The aim of this chapter is to introduce the reader to the term transition, its fundamental definition as well as its different manifestations and their contribution to a sustainability transition. The chapter starts with a general definition of the term transition. Then it gives an overview of possible changes in a societal system, with an emphasis on sustainability transitions. Finally, two examples for transition approaches are mentioned that are relevant in the context of a socio-ecological transition.

2.1.1 Basic Definition of Transition

The transition term is not entirely new and has been used already in different research areas like evolutionary biology, or demography (van den Bergh, Truffer and Kallis, 2011). In the past, there have been many types and forms of transitions, e.g. the transition from an agrarian to an industrial society, the system transition after the fall of the Iron Curtain in the Eastern European countries, or the (still ongoing) transition within modern economies' sectoral structures from the industrial towards the service sector.

A transition indicates a substantial change in the societal systems. Recently the term has been linked to the desire to make societies more sustainable. "Revolutionary changes" rather correspond to the term transformation (e.g. the transformation of former communist economies and developing countries to market economies) (Chappin and Ligtvoet, 2012). In the literature both terms are used, but the distinction is not always clear. In this paper we stick to the

[1] TRAFOREVIEW (Universität Wien, 2013), initiated by the European JPI Climate, is an on-going research project dealing among other things with visions and scenarios of a "socio-ecological transformation". The call of JPI Climate (2013) aims at informing and supporting societal transformations in the face of climate change and in line with sustainable development in Europe and globally. This project might provide a better understanding of the concept of a socio-ecological transition.

following differentiation: in contrast to a transformation process, which does not orientate towards a concrete target, transitions are evolutionary processes that mark possible development pathways, of which the direction and pace can be influenced by for example specific policies (Rotmans and Kemp, 2003). We are rather using the term transition in this paper, which does not imply that the term transformation cannot be used instead.

To define how a transition process looks like and where it shall lead to, a **transition object** and a **concrete target** at the end of the transition process must be determined ex ante. This resembles the empirical method of backcasting (in contrast to forecasting). The target points out which changes in the system structure are necessary (e.g. societal changes, technological changes, economic changes, environmental changes, changes in values etc.) to attain the desired new state of the system.

Since most of the changes mentioned above contribute in some form to a **societal transition** we refer to the following general description given by Rotmans and Kemp (2003: pp. 9-10), understanding transition "[...] as a long-term, continuous process of change during which a society or a subsystem of society fundamentally changes." The authors further describe transition as a **set of interconnected changes** reinforcing each other but taking place in different areas or domains, such as technology, the economy, institutions, ecology, culture, behaviour or belief systems. Accordingly a successful transition is a spiral that reinforces itself, driven by multiple causalities and co-evolution. The changes in the different domains do not necessarily occur at the same time since each of them has their own dynamics. For example, some economic changes like price fluctuations can occur very rapidly, while cultural changes or changes in ecological systems tend to be rather slow. A mixture of slow and fast dynamics determines the changes that underlie a transition whereas the slowest process influences the overall tempo and the direction of the whole dynamics. Depending on these dynamics a transition process can express itself by slow and fast developments (Rotmans and Kemp, 2003). According to Fischer-Kowalski and Rotmans (2009) there is a shared understanding that transition processes do not follow a linear, incremental path that leads from one state to another but rather refer to a possible chaotic and dynamic interim process. The processes can also end in lock-in situations or a collapse of the system.

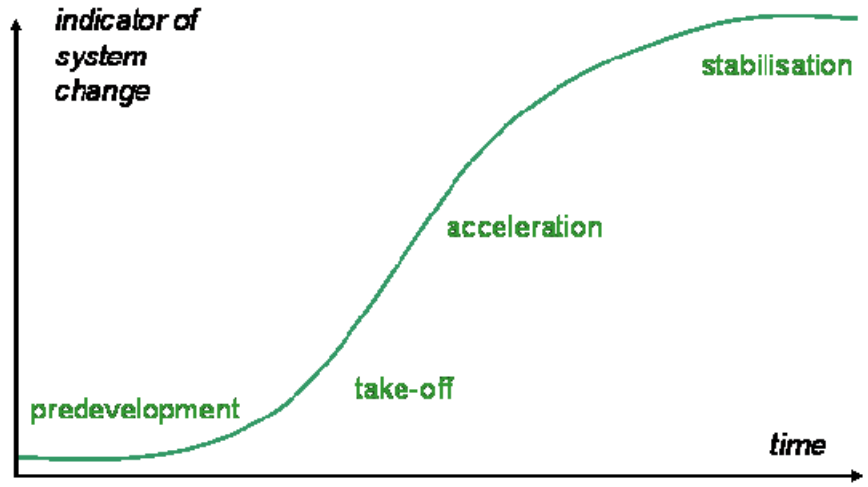
In the context of transitions thinking a **broad systems view** is required. This helps transition research to explain the **co-dynamics** of technologies, institutions, social and economic sub-systems and the conditions in functional domains like energy water, food, housing, etc (van den Bergh, Truffer, and Kallis, 2011). System innovations, defined as organisation-exceeding, qualitative innovations which are realised by a variety of participants within the system, fundamentally change both the structure of the system and the relations between the participants and are therefore necessary for transition processes (Rotmans and Kemp, 2003).

There exist **two transition approaches** describing the dynamics which underlie a structural long-term change of societal systems. One approach focuses on the temporal dimension of a transition (speed, size and time period) represented by the **multi-phase concept.** The **multi-level perspective** accounts for the level dimension of a transition (micro-meso-macro) and the changes in its structure. The two approaches have a different focus concerning transitions, but they can also be combined with each other.

The **multi-phase concept** describes transition in terms of four stages or phases (Rotmans and Kemp, 2003). These phases which are alternating over time typically form a so-called S-curve (Rotmans, Kemp, and van Asselt, 2001) (see figure 2). Starting point of this curve is the "**predevelopment phase"** in which the system is in a dynamic state of equilibrium. Its status quo changes in the background, but these changes are not visible yet. In the **"take-off phase"** the first ignition of structural changes is recognisable. They become obvious in the **"acceleration phase"**. The new state of equilibrium is then achieved in the **"stabilisation phase"** (Rotmans, Kemp, and van Asselt, 2001). It is again a dynamic state of equilibrium,

since a lot of changes are going on under the surface impeding a remaining status quo (Rotmans and Kemp, 2003).

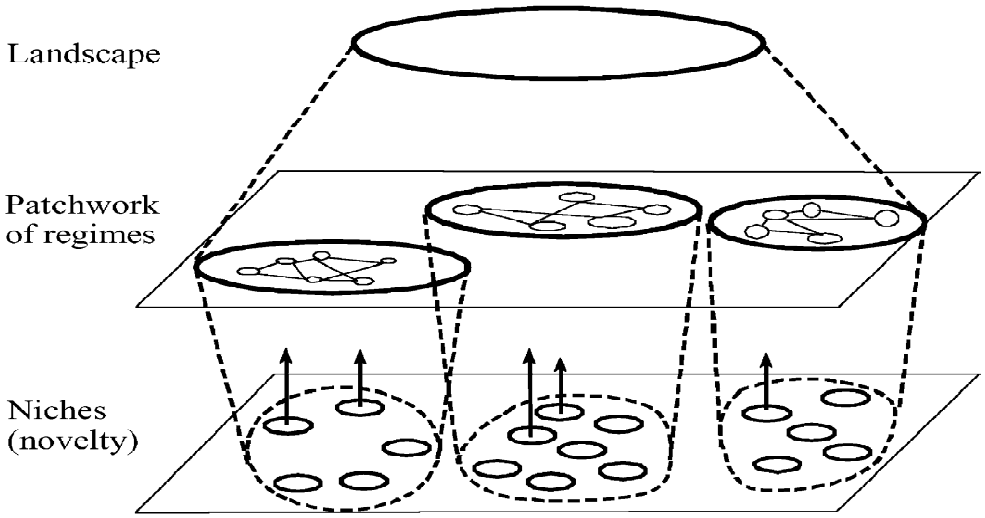
Figure 2: Multi-phase Concept



Source: Rotmans, Kemp, and van Asselt, 2001.

The **multi-level perspective** (see figure 3) consists of three levels: macro or landscape level, meso or regime level, micro or niche level. The **landscape level** includes for example demographical trends, political ideologies, societal values, and macro-economic patterns. Usually changes on this level are slow. It influences niche and regime dynamics and can cause systemic changes when rearranging the place of regimes and niches within the system. The regimes and niches themselves have little to no influence on the landscape level in the short-run (Geels, 2011; Lachman, 2013). Before describing the **regime level** it has to be clear what a regime is. Geels understands regimes as "semi-coherent sets of rules, which are linked together (Geels, 2004). It is difficult to change one rule without altering others. The alignment between rules gives a regime stability and 'strength' to coordinate activities." Other important elements at this level are social groups and the actors that are included by the groups. The actors share a set of rules or a regime and thus the subordinated different social groups share different rules. Hence we can distinguish between different regimes, e.g. technological regimes, policy regimes, socio-cultural regimes, financial regimes, socio-ecological regimes, socio-technical regimes etc. A change in a regime implies a change in the system in which it functions. However, regimes tend to be resistant to systemic change and thus to niches from the micro level which tend to replace the regimes (Lachman, 2013). The **niches** offer time-limited protection against dominant selection rules and thus support innovative activity. Such protected spaces are for example R&D laboratories or small market niches where special demands and thus the willingness to support emerging innovations do exist. By working on radical innovations, niche actors (such as entrepreneurs, start-ups or spinoffs) try to deviate from the regime or even to replace the incumbent regime. Niches tend to be more flexible and less bounded by rules. Therefore they provide more room for a systemic change than regimes, which makes them important for transitions. However, replacing an existing regime and initiating structural change is not easy because the regime is stabilised by lock-in mechanisms and/or niche innovations which may mismatch with existing regime dimensions (e.g. lack of appropriate infrastructure) (Geels, 2011; Lachman, 2013).

Figure 3: Multi-level Perspective



Source: (Geels, 2002)

2.1.2 Different Forms of Transition

As already mentioned, a societal transition originates from a set of interconnected changes which take place in different areas of the society. In figure 4 **societal transitions** are situated in the centre.

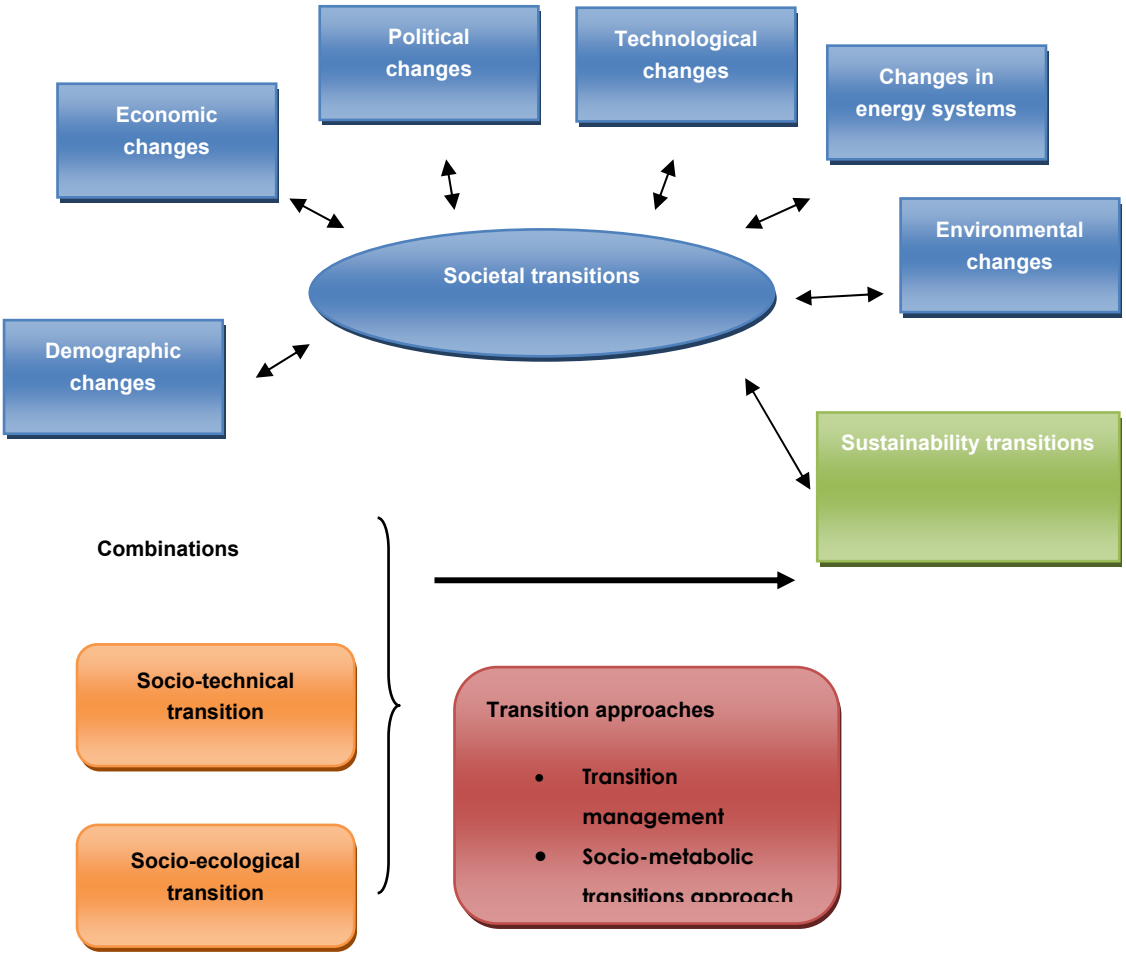
Example for societal transitions from social sciences

In the famous **Parsons model** of traditional/modern societies, transition takes place through differentiation and integration of social sub-systems. Societal transition towards modernisation "consists of a long-term generalized process of differentiation, specialization and mutual influence and adjustment among different sub-systems of a given social system, under the evolutionary law of the growth of complexity" (Squazzoni, 2008, p. 269). In his AGIL scheme Parsons identifies **four transition mechanisms** explaining the transition of social systems toward modernity: *structural differentiation*, which is the specialisation and differentiation between the four functional sub-systems located in every social system (i.e. Adaptation, Goal attainment, Integration, and Latency); *adaptation*, which is the availability of resources released by the old social structures, originally submitted to traditional constraints; *integration*, that is the inclusion of new structures, roles, values, norms; and *values' generalisation*, which is the formulation of universalistic normative standards that allows the effective integration of new structures. It is criticised that the macro deterministic model approach largely underestimates the relevance of individual action and the emergent nature of social patterns (Squazzoni, 2008).

This illustrates the influences of changes in different areas (demography, economy, politics, technology, energy system, or environment) on the change of a society or a subsystem of a society. On the other hand, societal transitions can also lead to or reinforce changes in these areas. Societal transitions might also result in a so called -sustainability transition (and vice versa). In the literature combinations of different transition forms like socio-technical or socio-

ecological transitions lead to sustainability transitions. Transition approaches like transition management and the Viennese socio-metabolic transitions approach which aim at a sustainability transition use these combinations in their concepts.

Figure 4: Different Forms of Transition



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Squazzoni (2008, p. 267) defines **societal transitions** as a "large-scale and long-term macro process through which a given social system radically changes its structural basis, in terms of new socio-technical practices, governance rules, social and economic institutions, cultural frames, and patterns of social life."

2.1.2.1.Transition in Different Subsystems of the Society

We can also look at other transition forms when considering various objects of transition. In this subchapter we look at economic, technological and political systems as transition objects.

Rostow (1960) and Boulding (1970) put forward the **economic concept of transition**. In this context economic transition is understood as a multi-staged development form a centrally planned economy to a market economy, accompanied by the evolution of new political and

social institutions (Rotmans and Kemp, 2003). There even exists a journal “Economics of Transitions” which focuses on transition economies in developing and former communist countries, but does not specifically address environmental or technological issues (van den Bergh, Truffer, and Kallis, 2011). **Technological transitions** do not only involve technological changes but have also an effect on changes for example in user practices, regulation, industrial networks, infrastructure or symbolic meaning. Therefore they can be also seen as major technological transformations affecting societal functions such as transportation, communication, housing, feeding etc. Geels (2002) regards technology from a sociological perspective indicating that technology, of itself, has no power and fulfils functions in association with human agency, social structures and organisations only. As example for a technological transition he mentions the transition in offices from punched card technology and small office technology to digital computers from the 1930s to the 1960s. **Political transitions** are for example the advent of democracy and the genesis of the welfare state (Meadowcroft, 2011).

2.1.2.2. Sustainability Transition

At present there is a focus on sustainability transitions in transition theory due to the recognised need of a more sustainable society. According to Lachman (2013) the interest in research on transitions towards a “sustainable future”, arising during the 1990s, was triggered by the introduction of the term “sustainable development” in the late 1980s.

Sustainability transitions are **defined** as structural changes in the co-dynamics of social, environmental and economic subsystems including technologies, institutions, organisations or behavioural patterns towards environmental and social sustainable alternatives (Lachman, 2013) that provide long term human well-being in the face of real bio-physical limits (Meadowcroft, 2011). **Possible problems** related to these structural changes are that many (unsustainable) systems (e.g. the current energy system that is mostly based on fossil fuels) are stabilised through various lock-in mechanisms (e.g. sunk investments in infrastructures, institutional commitments, power relations, political lobbying by incumbents or consumer lifestyles and preferences that may have become adjusted to existing technical systems) which may create path dependence and therefore make it difficult to dislodge existing systems (Geels, 2011). Another challenge for sustainability transitions is the long time period until the full effect of some environmental problems becomes apparent, thus sustainability issues are sometimes not perceived as urgent (Lachman, 2013). Also, environmental problems have different manifestations like the potential for reparability of environmental damages or the spatial and temporal range of the negative impact. These challenges indicate that a sustainability transition will need changes in the economic framework conditions (e.g. tax system, subsidies, regulatory frameworks) and changes in law (modifying the regulatory frameworks within which economic actors conduct their affairs), beside changes of individual and societal behaviours, in order to replace existing systems (Geels, 2011; Meadowcroft, 2011).

Van den Bergh, Truffer, and Kallis (2011) indicate that according to the recent literature sustainability transitions can be also related to a sort of „**sector transitions**“ in agriculture, transport, energy, water and health care. Infrastructure sectors like transport, energy and water supply provide basic services to all other activities and therefore are completely intertwined with the economy as a whole. This shows that the sectoral perspective also includes society and economy-wide changes that account for a transition. The sectors in which sustainability transitions are most needed (e.g. transport, energy, agri-food) are often characterised by large firms that possess **“complementary assets”** such as specialised manufacturing capability, experience with large-scale test trials, access to distribution channels, service networks, and complementary technologies. This situation gives incumbent firms a strong position compared to pioneers that are often responsible for developing environmental innovations. Incumbents are normally not the initial leaders of sustainability transitions, but their involvement and support of environmental innovations with their complementary assets and resources might accelerate

their breakthrough. However this would require a strategic reorientation of incumbents who presently still defend existing systems and regimes (Geels, 2011).

Energy systems and their transitions are central in the discussion about sustainability transition. Energy systems are largely based on fossil fuels. According to the World Energy Outlook (IEA, 2012) the world total final energy consumption is based on fossil fuels by 66.2%. The extensive use of such emission-relevant energy carriers leads for example to negative effects on the climate system or induces air pollution and thus makes changes in the energy system more relevant. There exists a rather conservative perspective which closely links future energy transitions to technological changes looking for example at increases in energy efficiency, radical changes of institutional settings in energy markets or the use of renewable energies. In this technological context, the development of new energy systems is closely linked to innovations and to their related costs. This raises the question if the innovation is advantageous in terms of capital or labour productivity or if there is a perspective of increasing future application potentials combined with long-run lower costs referring to "technological expectations". Additionally, the potentials from adopting new technologies depend on corresponding institutional and organisational changes and on the early technology adopters, who are the key kernels of learning, adaptation/modification of new energy technologies (Grubler, 2012, pp. 10-11). Beside the technological perspective on energy systems, the behavioural aspect of energy systems is of great relevance. In their "EnergyTransition" study Köppl, et al. (2011) focus on restructuring energy services which are considered to be important for achieving an energy transition. They differentiate between thermal energy services, energy services for mobility and for stationary engines in production processes, and specific electric energy services for lighting, electronics and other appliances. Their approach is interdisciplinary and recognizes that energy transition is not only a matter of technology, but that changes in behaviour of (the various groups of) energy consumers are a crucial success factor.

Achieving sustainability transitions may need **combinations of different transition forms**. In the recent literature on sustainability transitions changes in socio-technical systems (**socio-technical transitions**) are an important condition to move towards a more sustainable system. Socio-technical transitions are closely related to the before mentioned MLP transition typology focusing on system element interactions between socio-technical regimes and niches. A socio-technical system encompasses the following sub-systems: production, diffusion and use of technology by a society. It is furthermore a set of heterogeneous interlinked elements that fulfil a societal function (e.g. transport, communication, nutrition). These elements are represented through (i) a network of actors and social groups, (ii) formal, cognitive, and normative rules that guide their activities and, (iii) material and technical elements as artefacts and infrastructures (Papachristos, Sofianos, and Adamides, 2013). Analysing the interlinkages and the changes in the socio-technical subsystems and their elements helps to understand how these changes can contribute to a sustainability transition (Papachristos, Sofianos, and Adamides, 2013). Furthermore, socio-technical transitions play an important role in the transition management approach (see chapter 2.1.2.3.).

Another approach leading to a sustainability transition is the **socio-ecological transition**. As already indicated in the term, the focus is on the two complex systems society and nature, and the changes in their interactions. For example, the changing relations of land use, material and energy flows, population and economic growth are explored (Fischer-Kowalski and Haberl, 2007). The term socio-ecological transition is used by the Viennese socio-metabolic transition approach and also by the transition management approach. Unlike the definition of a socio-technical transition, there is no definition of a socio-ecological transition which is established

and broadly accepted in academia. But there is some on-going research (besides the WWWforEurope project) trying to conceptualise the meaning of a socio-ecological transition.[2]

2.1.2.3. Transition Approaches

There are many transition approaches aiming at a sustainability transition. Some examples are mentioned by van den Bergh, Truffer, and Kallis (2011) and Lachman (2013): *Strategic Niche Management* (closely related to the Multi-Level-Perspective) (see Kemp, Schot, and Hoogma, 1998), *Transition Management Approach* based on complex systems analysis (see Rotmans and Lorbach, 2009), *Innovation Systems Approach* (see Jacobsson and Bergek, 2011) or *Viennese Socio-metabolic Transitions Approach* (see Fischer-Kowalski and Haberl, 2007). Here we focus on two of these transition approaches which use the term socio-ecological transitions in their concepts (Fischer-Kowalski and Rotmans, 2009).

The **transition management (TM)** approach is a reflexive and participative governance concept attempting to manage transformative societal change towards a sustainable development, by influencing the speed and the direction of the change and by combining long-term thinking with short-term action through a process of searching for visions, experimenting and cycles of learning and adaptation. TM can be also seen as guided processes of variation and selection that help societies to transform themselves in a gradual, reflexive way. By engaging in co-evolutionary steering, societies are able to break free from existing practices and technologies (Lachman, 2013; Kemp, Loorbach, and Rotmans, 2007). A transition programme, which is legitimised through the political process, supports the improvement of existing systems (Rotmans and Kemp, 2003). TM regards the transition of a societal system as a cyclical process including the following components: At the *strategic level* the transition arenas, defined as a small network of various frontrunners, develop sustainability visions, initiate transition paths and draw up a common transition agenda. This agenda is implemented on the *tactical level*, in which the focus is laid on structural (regime) barriers (like regulatory, institutional, and economic conditions, consumer routines, physical infrastructures, or specific technologies). Optimally, with the consent of predominant regimes, the vision is now translated into a transition path leading to the long-term goal. Afterwards transition experiments are carried out at the *operational level*. They represent iconic projects with a high level of risk that can make a potentially large innovative contribution to a transition process. If the transition experiment is successful it can be repeated in different contexts and scaled up from the micro to the meso level. At the end of the cyclical path stands *monitoring and evaluation* of the learning processes, which may result in adjustments in the preceding levels. The concept of a cycle is not binding, but it shall visualise the need to connect the above mentioned activities and provides a logical order of this connection. In reality the sequence of the above mentioned steps is not fixed (Loorbach, 2010).

The **Viennese socio-metabolic transitions approach** analyses the contemporary and historical phenomenon of radical change in societies linked to changes in their relations to the environment. More concretely, the environment illustrates boundaries to the society which can be understood as a socio-metabolic system (Fischer-Kowalski and Rotmans, 2009). Crossing the boundaries leads either to a structural change or a collapse of the system (Lachman, 2013). This approach also refers to the term socio-ecological transition and defines it as a shift between socio-metabolic regimes. A socio-metabolic regime can be understood as a dynamic equilibrium of a system of society-nature interaction. It is furthermore characterised by the socio-metabolic profile of the society involved which accounts for biophysical variables like

[2] Examples for **on-going research** on socio-ecological transition/transformation: (1) the JPI CLIMATE project "TRAFOREVIEW" (Universität Wien, 2013); (2) MATISSE project (SERI, 2013); (3) The Great Transition Initiative (Raskinet, 2006). Examples for **political discussions/visions** on socio-ecological transition/transformation: (4) Europe 2020 strategy of the European Union (European Commission, 2010), (5) "Welt im Wandel – Gesellschaftsvertrag for eine Große Transformation" of German Advisory Council on Global Change (World Bank, 2012); (6) Vision 2050 of the World Business Council for Sustainable Development (WBCSD, 2010).

energy and material consumption and the human appropriation of net primary production, which is an indicator of land-use intensity (Hausknost, 2013). According to the Viennese socio-metabolic transitions approach structural changes in a society's **energy system** are the key to a transition; in other words: changes in the energy regime affects the society and its metabolism and the relation with external systems (Fischer-Kowalski and Rotmans, 2009; Lachman, 2013). Historic examples are the transition from agrarian to industrial socio-metabolic regimes like it happened in the United Kingdom starting in the 17th century. In comparison to the Viennese socio-metabolic approach, the transition management approach is more practical and was supported by a strong political trend towards achieving sustainability transitions in the Netherlands. The Viennese socio-metabolic approach represents a more theoretical framework. It has been applied globally to analyse nation states and local communities but rather to gain scientific insights than to initiate an actual socio-ecological transition (Fischer-Kowalski and Rotmans, 2009).

2.1.3 Conclusion

Why do we need to think about a (societal/socio-technical/sustainability) transition and why shall it be considered in the WWWforEurope project? van den Bergh, et al. (2011) list some reasons: 1) we are far away from solving environmental problems, thus there is a need for radical, large-scale and integrated socio-technical changes, well beyond traditional policy approaches; 2) technical innovations, which can contribute to solving those environmental problems, cannot diffuse in a large market without parallel, fundamental changes in economic and wider social-cultural conditions and also in individual and societal behavioural patterns; 3) recognising that current (environmental) policy does not work well, transition thinking can help to add realism about the complex political and socio-economic system in which policies need to be implemented and to function and thus the criterion of social-political feasibility is considered in a better way beside the usual criteria of effectiveness and efficiency.

First the WWWforEurope project will need to develop a vision where "its transition" shall lead to, independent of how this transition will be called in the end. It is more relevant to identify the contradictions, connections and possible trade-offs between the different sustainability targets relevant for the project (e.g. reducing the environmental pressure - increasing employment - improving distribution). Since these contradictions and trade-offs might provide barriers for implementing actions that lead towards a "socio-ecological" transition, they always need to be considered.

2.2 Sustainability

The fundamental aim of a socio-ecological transition is to arrive at sustainability. The concept of sustainability focuses on the pursuit and harmonisation of economic, environmental and social goals. Sustainable development requires meeting the needs of individuals and societies in the past as well as in the future, while respecting the limits of the natural environment, which is necessary to maintain life on earth. A major concern for sustainability is the equitable distribution of resources between the current members of society and the future generations, which requires the preservation of resources and the maintenance of environmental functions, globally and into the future.

In this chapter the concept of sustainability will be presented, starting with a historical overview of the development of the term and its entry into the mainstream political and public discourse. Then the most widely discussed dimensions of sustainability – the environmental, the social and the economic dimension - will be presented in more detail. The diverse views on sustainability prevalent in the different schools of thought will be compared and contrasted, along with the strong and weak sustainability principles. Finally, an outline of the EU sustainable development strategy will follow, along with an overview of the European progress towards sustainability.

Another important dimension of sustainability is fiscal sustainability, i.e. the ability of a government to sustain its current spending and tax policies in the long run without threatening government solvency or defaulting on some of its liabilities or promised expenditures. Efforts to maintain or to restore fiscal sustainability may be in conflict or may support other dimensions of sustainability. The fiscal dimension of sustainability cannot be addressed in more detail here. In the context of a socio-ecological transition, however, one of the most important – and still unanswered or rather widely neglected – questions in the respective literature is which implications a transition to a more sustainable path of growth and development does have for public finances, and particularly how to secure sufficient revenues to finance government expenditures.

2.2.1 Historical Overview of the Basic Concepts and Definitions

Over the 1960s and 1970s scientists from various fields started calling attention to the consequences of industrialisation, resource depletion and pollution, stressing the importance of planetary limits and the degrading state of the natural environment. The book by Rachel Carson 'Silent Spring', published in 1962, is considered by many as a turning point in the understanding of the interconnections between environment, economy and societal well-being. Soon after its publication the book spurred a debate in the US over the hazard of using chemical pesticides, the ethics and responsibility of science and the limits of technological advance (Carson, 1962). The work of Carson instigated grass-roots movements which called for the protection of the environment through governmental regulation.

Ten years later, in 1972, another influential book was released: "Limits to Growth" by the Club of Rome, which raised awareness over the environmental and social consequences of rising levels of material consumption and rapid population growth. The study pointed towards an ecological "overshoot" and a pending collapse of the global system, driven by levels of production and consumption beyond the carrying capacity of the natural environment (Meadows et al, 1972). Contemporary to the "Limits to Growth" was another influential event – the United Nations Conference on the Human Environment, which took place in Stockholm in 1972. It has been generally accepted that the contemporary idea of sustainability stems from the Stockholm conference, during which for the first time global environmental problems were placed on the political agenda.

The term "sustainable development", however, came into policy discourse later, with the publication of the report "Our Common Future" in 1987 by the Brundtland Commission, formally known as the World Commission on Environment and Development (WCED, 1987). This so-called Brundtland report attempted to integrate the need for environmental policies and development strategies, embracing the most prominent and at the same time very general definition of sustainable development as "development that meets the needs of the present without compromising the ability of future generations to meet their own needs" (WCED, 1987, p. 8). Despite the simplicity of this approach, it has been subject to much criticism due to the underlying complexity and contradictions in the proposed definition. Defining the "needs" of each generation has been found to be problematic, since it is unlikely that subsequent generations will have the same needs as present ones. Some even see development as the primary driver of changing needs (Redclift, 2009). Another problem arises when defining needs in the context of different cultures. Redclift (2009) points out that sustainable development is embraced universally, but it is likely to be perceived differently in various societies.

The concept of sustainability entered into the mainstream political and public discourse after the Earth Summit took place in Rio de Janeiro in 1992 (UNCED, 1992A). The publication of the Rio Declaration reflected an increasing concern with environmental issues, which were for the first time seen as global challenges. Accordingly, emphasis was placed on the need for global solutions and shared responsibilities in order to tackle the problems of the natural environment (UNCED, 1992B).

Since the Brundtland report, more definitions of sustainable development have emerged, which introduced a stronger differentiation in terms of environment, society and economy. A more narrowly defined concept requires "maximising the net benefits of economic development, subject to maintaining the services and quality of natural resources" (Barbier, 1989), thereby neglecting the social dimension of sustainability. Viederman (1994) provides an extensive

definition of sustainability as a participatory process, in which community respects and makes prudent use of all its resources - natural, human, human-created, social, cultural, scientific etc. Accordingly, sustainability is perceived as the possibility of present generations to attain high degrees of economic security and to realise democracy, while maintaining the integrity of the ecological systems upon which all life and all production depends. All these definitions postulate that living within the limits of the natural environment is a major precondition for achieving long-term sustainability. The equitable distribution of resources and opportunities within the same generation and between succeeding generations is another common concern in most definitions of sustainability.
Although many authors use the terms sustainable development and sustainability interchangeably, they have to be distinguished carefully. Eurostat (2011) states that "sustainability is a property of a system, whereby it is maintained in a particular state through time". This implies a condition at which the system has reached an ultimate state of development and remains uninterrupted thereafter. In contrast the concept of sustainable development refers to a dynamic process which involves constant change but in a way which does not threaten or violate the current state of sustainability (Martin, 2003).

2.2.2 Daly's Steady-state Economics

Redclift (2009) argues that the term "sustainable development" can be, depending to its usage, an oxymoron, with the interpretation of the two components "sustainable" and "development" strongly contrasting in their respective definitions. This is specifically the case when development is perceived as synonymous for growth. Earlier Herman Daly (1993) discusses the notion of "sustainable growth" as intrinsically contradictory. Daly perceives the economy in its physical dimension as an open subsystem of the earth's ecosystem. In contrast to the economic subsystem, the ecosystem is defined as finite, non-growing, and materially closed. According to Daly's rationale, as the economic subsystem grows it captures an increasing proportion of the total ecosystem in itself. As a subsystem of a closed ecosystem, the economy cannot grow indefinitely, but it is restrained by the boundaries of the natural environment. Hence, continuous growth cannot be sustainable, but continuous development is possible. Here "sustainable development" is understood as "development without growth".[3] Such development entails qualitative improvements of the physical economic base, for example through the adaptation and improvement of knowledge, organisation and technical efficiency (Daly, 1993). The process does not involve the increasing assimilation of the ecosystem by the economic subsystem, but rather stops at a scale at which the remaining ecosystem (the environment) can continue to function and renew itself on a continuous basis. Hence, Daly argues that our understanding of the term "sustainable development" should not be mistaken with the oxymoron "sustainable growth", since the two are intrinsically different.
Daly (1993) defines an economy which is in sustainable development as a "steady-state" economy. It is perceived as an economy which has reached an optimal scale relative to the ecosystem. A "steady-state" condition requires that the scale of the economy, i.e. its resource throughput, remains constant at a level which depletes environmental resources within their regenerative capacity and pollutes the ecosystem within its assimilative capacity (Daly, 1993). Daly argues that beyond this optimal scale, a further growth of the economic subsystem will entail larger ecological costs than production benefits, which would limit or even reverse our ability to alleviate poverty and to create wealth. Finally, Daly argues that a steady state economy is not in a static position, but rather in a dynamic process of continuous maintenance and regeneration, i.e. Daly envisages an economy in a dynamic equilibrium with the surrounding environment.

2.2.3 Dimensions of Sustainability and their Hierarchical Order

Since the release of the Brundtland Report, it has become the cornerstone of an extensive and still on-going discussion on the concept of sustainability. Sustainable development has emerged

[3] For an overview of the various approaches to growth, see chapter 2.3.

as a multi-dimensional concept, encompassing at least three dimensions of objectives: environmental, economic and social (or socio-cultural) (Rogall, 2008). Environmental sustainability requires the use of natural resources within the carrying capacities of ecosystems and the preservation of environmental capital (Dresner, 2002). This involves the maintenance of a stable resource base, avoiding the over-exploitation of renewable resource systems or environmental sink functions, and depleting non-renewable resources only to the extent that investment is made in adequate substitutes (Harris, 2003). A sustainable economic system, on the other hand, encompasses the production of goods and services on a continuous basis, the maintenance of manageable levels of government and external debt and the prevention of extreme sectoral imbalances (Harris, 2003). Finally, a socially sustainable system embraces "fairness in distribution and opportunity, adequate provision of social services including health and education, gender equity, and political accountability and participation" (Harris and Goodwin, 2001).

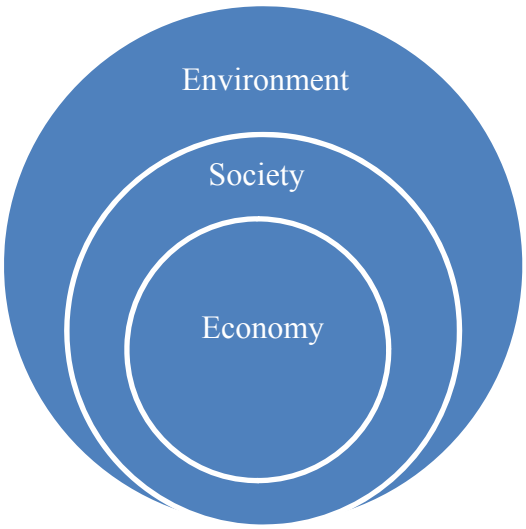
The integration of the economic, environmental, and social aspects of sustainable development and the relations between them have been subject to debates (Lozano, 2008). The weight given to each of the three dimensions of sustainability varies greatly and continues to cause considerable controversy. The frequently used graphic illustration of the sustainability triangle as depicted by Munasinghe (2007) assumes an equal position of the three sustainability dimensions. In a similar vein (Lozano, 2008) the three components of sustainability are often depicted as three interlocking circles, where the union created by the overlap between the economy, environment and society represents sustainability (Figure 5). This representation assumes that economic, social and environmental goals can be pursued simultaneously and disjoint from one another without having to expect trade-offs or synergies between the different dimensions of sustainability.

Figure 5: Equal Position of the three Sustainability dimensions

Source: Munasinghe, 2007.

Hart (2000) suggests an alternative structure of concentric circles, where the economy exists within the society and the natural environment surrounds both (Figure 6). Hart's representation implies that society can exist without the economy, but not vice versa. Similarly, the natural environment can exist without human beings, whereas the reverse is not true.

Figure 6: Embedded Structure of the three Sustainability Dimensions

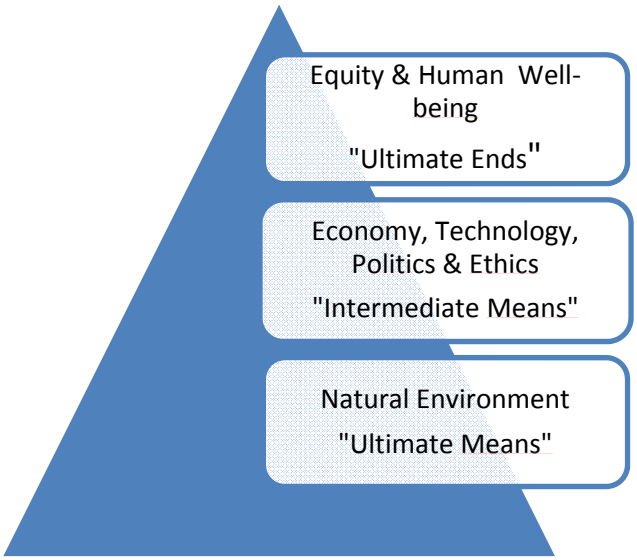


Source: Hart, 2000.

An alternative view on the relationship between environment, society and economy is put forward by the economist Herman Daly (1973). Daly places the three dimensions of sustainability, the so-called 3 E-s: environment, equity, and economy, into a clear hierarchical order (Figure 7). The environment, as “ultimate means”, constitutes the foundation of the triangle, while equity and human well-being are the “ultimate ends” at the highest hierarchical level. The economy, along with technology, politics and ethics, is placed in the middle of the triangle, as they transform “means” into “ends”.

The hierarchical order underlying Daly’s triangle implies that equity and human well-being cannot be achieved without an intact natural environment as necessary precondition. Herein lies the root of the argument giving highest priority to the ecological dimension of sustainability (Rogall, 2008). Daly also makes clear that the economy, instead of being an end in itself, should rather be perceived as an instrument to achieve human well-being and equity as ultimate ends. Daly’s hierarchical order implies trade-offs between the three sustainability dimensions. In contrast, the Brundtland Report places more emphasis on – or even assumes – complementarity between the three dimensions of sustainability, in particular between economic growth and the conservation of the natural environment (Ekins, 2000).

Figure 7: Daly's Sustainability Triangle



Source: Meadows, 1998.

It must be recognised, as Bass and Dalal-Clayton observe, that in situations where integration of the three factors is not possible, the process should involve "making alternative choices and negotiating trade-offs" (2000: p. 9). The authors assert that such factors as peace and security, prevailing economic interests, political systems, institutional arrangements and cultural norms will undeniably influence policy decision-making and negotiations. In this case, the governance of this process, with particular emphasis on the institutional aspects, would be critical.

In that line of argument, a fourth pillar of sustainability has been proposed – culture, which has emerged in a new interdisciplinary approach. The aim of cultural sustainability is to evaluate the importance and the impact of the other three pillars – environment, economy and equity, in relation to their implementation in cities and communities (Hawkes, 2001). Culture is broadly defined by Hawkes in terms of society's values and aspirations, as well as the way these are developed and communicated. Hawkes argues that the planning and implementation of all public policy needs to be evaluated through a cultural framework, which corresponds to the values of society. The development of such a cultural framework is perceived to be an essential step in the achievement of a sustainable and healthy society. Hawkes' arguments imply that a sustainable culture needs to be embedded in a sustainable society in order to arrive at a sustainable future. His key conclusion is that cultural vitality, in addition to social equity, environmental responsibility and economic viability, are the building blocks of sustainable development.

The various components of sustainability and their multi-dimensional objectives raise complications and conflicts in the realisation of a sustainable development strategy. In the perception of many, the central characteristic of sustainable development as "maintaining the capacity of the joint economy-environment system to continue to satisfy the needs and desires of humans for a long time into the future" (Common and Stagl, 2005, p. 8) is threatened by the current scale and composition of economic activity. At the same time, the need to increase the scale of economic activity in order to reduce poverty is widely recognised. Serving both goals potentially results in an intergenerational equity conflict, but also in international/regional conflicts, particularly between the rich industrialised countries on the hand and the emerging economies on the other hand.

One fundamental challenge on the way to sustainable development is the rebound effect. According to standard economic theory an increase in resource efficiency decreases the price of consumption goods and thus increases households' disposable income. As a result, consumers increase their consumption of the respective good (and/or other goods), which may (over-) compensate for the energy/resource saving effect of the initial increase of energy/resource efficiency (Sorrell and Dimitropoulus, 2010).

2.2.4 Sustainability in the Different Schools of Thought

The various economic schools of thought differ in their approach towards sustainability, especially with respect to environmental considerations. Neoclassical economic theory views all economic processes as processes of trade on the market (Harris, 2013). Environmental economists employ the tools of conventional (neoclassical) economists in order to deal with issues of sustainable development. Market intervention by the state ensures that economic agents pay for the environmental damage they cause (market failures are corrected by internalising externalities). Further, it is assumed that natural capital can be substituted by human-made capital in the production process (so-called weak sustainability, see the next paragraph) such that consumption (the central source of welfare) remains constant over time (Common and Stagl, 2005). However, many authors have questioned the fundamental assumptions of neoclassical theory, including the notion of consumer sovereignty and homo economicus, the ability of markets to self-regulate and the substitutability of natural resources and nature as an object of subjective valuation (Rogall, 2008).

Ecological economists attempt to combine the view of ecologists, who perceive humans as part of the overall ecological system, with the economic perspective. Accordingly, they postulate that economic decisions cannot be separated from considerations about the ecosystem. Central to the work of ecological economists is the concern about the limits and boundaries of the natural environment, upon which we are dependent. Ecological economists define sustainability in terms of the *resilience* of ecosystems, i.e. the ability of ecosystems to adapt to changing conditions and to maintain their structure and functions if disturbances occur (Common and Stagl, 2005). Ecological economists define genetic diversity as the key to maintaining resilient ecosystems (Holling, 1973; 1986). Common and Stagl emphasise that "we need to worry about sustainability as resilience if we have any concern for the interest of future generations" (2005, p. 377). Common and Perrings (1992) question the ability of the prevailing economic system to ensure resilience. The authors argue that "there may be no close relationship between economic efficiency and ecological sustainability" (Common and Perrings, 1992, p. 7), implying that the current production and consumption activities might be seen as efficient in economic terms, but at the same time they have a detrimental effect on the ecological resilience of the planetary system. Hence, modification of production and consumption activities is deemed as necessary by ecological economists in order to preserve the resilience of ecological system (Harris, 2003).

Weak versus Strong Sustainability

Two forms of capital have been broadly defined in the academic literature – natural capital and human-made (manufactured) capital. Daly (1994) distinguishes two forms of sustainability – weak and strong, depending on the perceived degree of substitutability or complementarity between the two forms of capital. The strong sustainability perspective is based on the principle of complementarity between natural and manufactured capital. This view is largely held by ecological economists who argue that natural capital needs to be given a priority over the generation of income through human capital creation, since manufactured capital depends on the stock of natural resources available (Pearce, 1991). In terms of operationalisation of the strong sustainability principle Costanza and Daly (1992) propose the following decision rules: First, consumption of renewable natural capital should be limited to a sustainable yield level, meaning that its functions (source and sink) remain intact. Second, the gains from extracting

non-renewable natural capital should be reinvested into renewable natural capital. Optimally the depletion of non-renewable resources should be kept at a rate equal to the rate of creation of renewable substitutes (Daly and Townsend, 1993). In contrast, the weak sustainability principle has been advocated by neoclassical economists who postulate perfect substitutability between natural and manufactured capital. According to the weak sustainability criterion a sustainable consumption path requires only that the total value of human-made and natural capital remains constant over time (Common and Stagl, 2005).

2.2.5 The EU Sustainable Development Strategy

Sustainability has been anchored as a fundamental goal of the EU since 1997 when it was incorporated into the Treaty of Amsterdam as a central objective of EU policies. The EU adopted a sustainable development strategy launched in Gothenburg in 2001, which was renewed in 2006. Furthermore, sustainable development is one of the main principles of the strategy for growth and jobs within Europe 2020. The final objective is to enhance the quality of life and well-being for the current as well as for future generations. Progress on the road towards sustainable development is constantly monitored through reports produced by Eurostat every two years since 2005. It has been explicitly pointed out that this assessment is relative, not absolute, and Eurostat (2011) stresses that "[t]he strategy aims to achieve continuous improvement of quality of life, and the focus is therefore on sustaining the process of improving human well-being, rather than seeking a stable equilibrium."

The sustainable development strategy rests on four key objectives and a range of policy guiding principles. The four key objectives encompass environmental protection, social equity, economic prosperity, and meeting international responsibilities. The monitoring report (Eurostat, 2011) presents over 100 indicators, out of which eleven serve as headline indicators and form the basis for an overall evaluation of European progress towards sustainable development. Table 1 shows that the overall picture is rather mixed.

Table 1: Evaluation of Changes in the Headline Indicators, EU-27, since 2000

SDI theme	Headline indicator	EU-27 evaluation of change
Socioeconomic development	Real GDP per capita	
Sustainable consumption and production	Resource productivity	
Social inclusion	Risk of poverty or social exclusion (*)	
Demographic changes	Employment rate of older workers	
Public health	Life expectancy and healthy life years (**)	
Climate change and energy	Greenhouse gas emissions	
	Consumption of renewables (***)	
Sustainable transport	Energy consumption of transport relative to GDP	
Natural resources	Abundance of common birds (****)	
	Conservation of fish stocks	
Global partnership	Official Development Assistance	
Good governance	*[No headline indicator]*	:

(*) from 2005

(**) from 2002

(***) from 2006

(****) EU-aggregate based on 19 member states

Source: Eurostat (2011).

2.3 Growth

Increasing social welfare in developing as well as already developed countries is the paramount policy goal. Or it should be, as many argue. Related to this is the provision of employment opportunities for everybody. How to achieve these goals? “Through growth” has long been the standard, undisputed answer to this question. In the view of the downsides to economic growth we are now witnessing the need to reconsider this answer is stronger than ever.

Among the negative effects of economic growth environmental degradation is the most critical one. Previous economic growth was brought about largely at the expense of the natural system. In this respect growth was and still is achieved also at the expense of future generations, who, however, on the other hand are also benefiting from better education, health, infrastructure, life expectancy as the result of past growth. In any case, the negative repercussions of growth can no longer be overlooked. They call for reconsidering objectives for rethinking of strategies to reach them.

New growth concepts and strategies addressing environmental problems and other severe current problems have been proposed in the recent literature. Some, such as the green growth strategy, provide options how to solve these issues through changing the current system to become more sustainable. Others, among them degrowth and a-growth, shift economic debate from its predominant focus on economic/GDP growth towards a much broader discussion of how to increase human well-being.

The different growth strategies put forward in the economic literature focus on different types of growth. Paul Ekins (2000) highlights the importance to distinguish between mainly three different types of growth: physical growth (increase in the amount of resources used by an economy), economic (GDP) growth, and growth in human welfare. The sustainability problems our society is currently facing force us to reconsider if economic growth is a "necessary condition for the prosperity of society" (Foxon, et al., 2013).

The aim of this chapter is to provide an overview of the various growth concepts put forward in growth theory and their recent extensions. We depart by presenting the fundamental assumptions underlying modern growth theory. This is followed by a presentation of the main ideas behind the green growth concept, which tries to reconcile economic growth with environmental sustainability. These approaches to growth which remain within a conventional economic growth perspective are contrasted with the concept of degrowth as a new and more radical approach to address the current sustainability problems. Finally the concept of a-growth is presented, which might reconcile proponents of various approaches to growth, as it calls for prioritising of society's main goals instead of solely focusing on economic growth.

2.3.1 Neoclassical Economic Growth Theory

The origin of modern growth theory lies in the work of Robert Solow and dates back to 1956 to Solow's article "A contribution to the theory of economic growth" (Solow, 1956). Modern growth theory is still widely used in economic theory although the modelled processes sometimes seem to be too simplistic (Foxon, et al., 2013) and are based on critical assumptions. According to the neoclassical growth model output (understood as GDP) grows due to increases in the inputs physical capital, labour and productivity used to produce it. Environment and dependence of the economy on the environment are either missing in the neoclassical Solow model or the way of their introduction into the model is highly arguable.

The standard Solow model is based on the output variable (Y) and the input variables capital (K), labour (L) and knowledge (human capital, productivity) (A). This leads to the following production function:

$$Y(t) = F(K, L, A) \qquad (1)$$

Equation (1) shows that the production factors capital, labour and knowledge are combined in order to produce output (or GDP) (Romer, 2001). The **growth in output** over time and therefore also the **growth in GDP** is explained by increases in the production factors K and L and growth in productivity A. **Growth in labour L** is driven by population growth, labour force participation and/or improvements in health and education. The **capital stock K** is assumed to be increased by investment, which can be also understood as a share of output (Hallegatte, et al., 2011). The rest, the so-called residual, explains growth in productivity A and is also understood as technological change. It is based on investment in education and R&D, economies of scale and learning by doing (World Bank, 2012).

The production function (1) as the core of modern growth theory rests on a number of critical assumptions. Firstly, **constant returns to scale** are assumed in the two arguments capital and effective labour, indicating that the duplication of the quantities of capital and effective labour leads to a duplication of the produced amount. This means that the Solow model assumes "[...] that the economy is sufficiently large that, if capital and labor double, the new inputs are used in essentially the same way as the existing inputs, and thus that output doubles" (Romer, 2001, p. 10). Secondly, other inputs than capital, labour and knowledge like for example land use or natural resources are relatively unimportant in this model. Consequently the availability of natural resources does not seem to constrain growth (Romer, 2001).

Thus, in standard neoclassical growth models the **environment has no productive role** regarding output growth. At some point, however, it became clear that environmental

degradation, like pollution or resource exhaustion triggered by economic production, may well reduce measured output: global warming for example can decrease output through its impact on sea levels and weather patterns (Romer, 2001). This calls for the inclusion of the environment into production theory. Thomas Malthus (1798) already had the idea that economic production is directly dependent on the stock of natural resources and on environmental quality, so that environment needs to be an argument of the production function. Only in the early 1970s this idea was taken up again, e.g. by William Nordhaus (1974) or Robert Solow (1974). The resulting modification of modern growth theory defines environment as **"natural capital"** which is a direct input needed for growth (Hallegatte, et al., 2011). The classification of the environment as natural capital has three characteristics: 1) providing resources, 2) assimilating waste and 3) performing various environmental services which sustain life, including climatic regulation and ecosystem health (Jacobs, 2012). This implies that investment in this kind of capital through, for example, environmental policies is possible and comparable to investment into physical capital (World Bank, 2012).

The result is a production function extended by natural resources (or natural capital) R which are needed in the production process:

$$Y(t) = F(K, L, A, R) \qquad (2)$$

This formulation introduces the environment into production theory as a limiting factor; on the one side because of its finite ability to produce resources and on the other side due to its finite ability to absorb waste. If environmental management is deficient natural capital depreciates or is destroyed indicating a direct impact on output (Hallegatte, et al., 2011).

At this point the already mentioned distinction between strong and weak sustainability which deals with the question whether production factors are **complements or substitutes** is crucial. If all production factors are considered as substitutes this would indicate that resource exhaustion or more general environmental degradation can be compensated by investing more in physical or human capital or in technical change. Modern growth theory explicitly or implicitly assumes strong substitutability, which is, however, a rather critical assumption, since the potential of the other production factors (K, L, A) to substitute for natural resources is obviously limited (see discussion "Georgescu-Roegen versus Solow/Stiglitz" in Daly (1997)). Hallegatte, et al. (2011, p.6) give the following example: "Soil and water are necessary for food production even if technology and increased labor intensity can reduce the quantities needed." Consequently natural resources should be rather regarded as complements or weak substitutes, because protecting the environment is necessary to maintain or even increase economic production (Hallegatte, et al., 2011).

2.3.2 Green Growth

The green growth approach is perceived and advocated by its proponents as a way to reconcile economic growth, which is seen as a precondition to avoid unemployment and to increase a society's well-being, and environmental sustainability. According to green growth proponents, the growth indicator "GDP" is sometimes misleading since it often neglects or does not give enough consideration to the negative impact of economic activities on the environment. They see many reasons for the development of new growth concepts moving away from the sole focus on GDP growth based on growth in production factors. For example, economic activity negatively impacts on environmental systems and creates imbalances which are putting economic growth and development at risk, or the undervaluation and mismanagement of natural capital (e.g. natural resource stocks, land and ecosystems) imposes costs to the economy and human well-being (OECD, 2011A). The current lack of coherent strategies to deal with these issues creates uncertainty, inhibits investment and innovation and can thus slow economic growth and development. Against this background green growth is seen as a possibility to allow for economic growth while achieving environmental protection. According to a convenient

definition by the World Bank, “Green Growth is about making growth processes resource-efficient, cleaner and more resilient without necessarily slowing them."(Hallegatte, et al., 2011).

According to **standard economic theory** economic output depends on the maximum production level possible with the available technology (based on the production factors: physical capital, labour, productivity and environmental inputs) represented through the “production frontier”. Moreover actual economic output is determined by efficiency, reflecting how close the real-world production system actually is to the production frontier. Green growth policies can support the economy through correcting (environmental) market failures and through increasing its efficiency while protecting the environment (World Bank, 2012).

The green growth concept can be applied in a broad sense trying to make current growth paradigms more environmentally sustainable. It may also be associated to specific topics like climate change mitigation (Huberty, et al., 2011). They argue that economic growth can be promoted by reducing emissions. For example, investment in low-carbon technology and infrastructure can create new jobs in a depressed economy. A more ambitious view even sees the chance for a new “green industrial revolution” (Huberty, et al., 2011).

2.3.3 Degrowth

More recently, some economists argue that green growth does too little to arrive at the transition necessary to preserve earth’s biophysical system (e.g. Jackson, 2009; Victor, 2010). A radical change of norms and values would be needed, recognising that changes towards green technologies on the production side are not enough. “Degrowth” paves the path towards a future of this kind.

At the core, degrowth aims at economic downsizing. Kallis (2011) defines sustainable degrowth as “a socially sustainable and equitable reduction (and eventually stabilisation) of society’s throughput.” Throughput is the amount of materials and energy, extracted, processed, transported and distributed by society in order to consume, which in the end is returned to the environment as waste (Daly, 1996). This definition follows from the conviction that with continued economic growth in developed countries, irrespective of whether it is smart, sustainable or green, current environmental problems cannot be solved. On the contrary, developed economies not only have to stop growing, they have to shrink, to allow for much needed growth in developing countries without sacrificing the world’s natural system.

2.3.3.1. Limits to Growth

Proponents of degrowth argue that the boundaries of earth’s ecological system have already been transgressed by human actions. Relying on efficiency gains through employing cleaner technologies does not go far enough. The only way to postpone total degradation of the world’s biophysical system and to allow for some recovery of the environment is, therefore, sustainable degrowth. In other words, the question is not *if* degrowth is required but *how* it can and should be managed to arrive at a prosperous and stable society (Kallis, 2011; Pirgmaier, 2012; Georgescu-Roegen, 1973).

The roots of the degrowth concept lie somewhere in the 1970s. The publication of *The Limits to Growth* in 1972 by the Club of Rome (Meadows, et al., 1972) led to an extensive discussion of issues related to growth and its boundaries set by world’s ecological system. Although criticised by some, the simulations run by the authors in the early 1970s clearly showed that economic growth cannot continue infinitely. Sooner or later economies would hit biophysical constraints beyond which further growth would be impossible. However, under certain assumptions the model simulations also predicted that a decent standard of living for the population as a whole could be achieved also within these constraints. According to Meadows, et al. (1972), this scenario, where no collapse of the economic and environmental system occurs during the

twenty-first century, could however only be achieved if a number of far-reaching policies[4] were implemented before 1975.

Three updates of *The Limits to Growth* were published, the first one in 1992 (Meadows, Meadows and Randers, 1992), the second one in 2004 (Meadows, Meadows and Randers, 2004), and the last one in 2012 (Randers, 2012). In all updated editions the authors critically revisit their results only to find that their conclusions are not only still valid, but rather need to be reinforced and require a radical decline in material and energy use.

This needs to be accompanied by drastically increasing the efficiency with which both, material and energy, are used. Further, current policies and practices that lead to yet higher material use and population growth need to be revised. Therefore, if long-term and short-term goals are well balanced and the focus of policy actions shifts from the quantity of output (GDP) to sufficiency, equity and quality of life, a transition to a sustainable society can be reached (Meadows, Meadows and Randers, 1992).

Degrowth offers a vision for such a transition. It envisages mankind's near future as a positive social process towards an economy with reduced material throughput, yet with qualitative changes and innovations (in economic, social and cultural areas) still adding to well-being. The reduction of throughput is irreconcilable with further economic growth and will therefore most likely lead to (GDP) degrowth (Kallis, 2011).

2.3.3.2. Managing without Growth

As Victor and Rosenbluth (2007) summarise, there are three main arguments why economic (GDP) growth should become less important as a policy goal in developed countries (Victor and Rosenbluth, 2007). First, continued growth patterns in developed countries are unsustainable in the future due to environmental and resource constraints. Second, it can be argued that in developed countries economic growth subtracts more from well-being than it adds to it (e.g. through the environmental damage it causes). Third, policy objectives such as the absence of poverty, full employment and environmental protection can be attained without growth in developed countries.

The resource constraints put forward in the first argument arise from the fact that natural resources do not grow indefinitely. Production uses renewable and non-renewable resources as inputs making economic growth dependent on the availability of these resources. An economy with growing population using renewable resources as inputs to its production cannot grow beyond a certain level, and this level depends on the maximum sustainable yield that can be harvested. With renewable resources there is a remedy however; substitution possibilities and technological progress allow for some economic growth, as these resources can either be replaced by others or they can be used in a more efficient way. Contrary to this, there is no sustainable yield for non-renewable resources. Depending on the importance of non-renewable resources in production and the availability of substitution possibilities, the period of economic growth can be of longer or shorter duration. With no substitution possibilities growth will be a transitory phenomenon, even in the presence of technological progress (Common and Stagl, 2005).

Apart from resource constraints, there are various environmental and biophysical constraints making economic growth beyond a certain level unsustainable. An increasing number of researchers now investigate the economic problems arising from climate change and how to

[4] To list a few: The size of the human population is stabilised at 1975 levels; technical progress is such that after 1975 resource use per unit of industrial production is one quarter of what it was in 1970; after 1975 technical progress is such that waste generation per unit of industrial and agricultural output is one quarter of what it was in 1970 (Common and Stagl, 2005, p. 243) .

deal with them.[5] Their findings suggest that there is a limit to economic growth set by world's closed biophysical system.

The second argument blends into the current discussion on well-being. Empirical studies find that while well-being rises with income in countries having low levels of GDP per capita, it does not increase with income in developed countries (Common and Stagl, 2005).[6]. On the contrary, current economic growth in developed countries involves environmental problems, which diminish quality of life and therefore well-being (Stiglitz, Sen, and Fitoussi, 2009).

The third argument stating that important policy objectives, such as reducing poverty, full employment and environmental protection, can be reached without economic growth is the most controversial. Many discard the possibility of reducing global economic growth by arguing that poverty cannot be combated effectively without economic growth. Growth in recent decades was, however, accompanied by increasing income inequality in many countries (Victor, 2010) – albeit not on a global scale, as in general inequality across countries decreased. Further, it needs to be pointed out that while proposing to do without growth in developed countries, advocates of degrowth do not advise developing countries to follow the same path. On the contrary: reducing growth in developed countries would increase the space for economic growth in developing countries and would thus give them more options to solve the problem of poverty. Actually, the reduction of growth in developed countries appears as necessary condition to allow for catching-up in the less developed countries within the existing global biophysical and environmental boundaries. As environmental damage caused by developed countries, the effects of which are felt disproportionately more in the developing world, will be reduced, the population of developing countries will become better off (Common and Stagl, 2005; Victor, 2010).

Economic growth is being regarded as a policy priority not only for its assumed benefits regarding poverty reduction but also as a precondition to achieve full employment. Victor (2010), investigating the economic and environmental effects of a scenario without economic growth, found that full employment could nevertheless be reached under certain circumstances. The key factor in his study is a shortened work year, which would allow to distribute employment among a larger part of the labour force, eventually securing full employment (Victor, 2010).

Expectations about decoupling of economic growth from increases in material and/or energy use have been disappointed (Jackson, 2009). This may be due to the fact that efficiency gains are largely accompanied by rebound effects, increasing consumption of the environmentally harmful goods (Sorell, 2007). Similarly, the relationship between per capita income and environmental damage as assumed by environmental Kuznets curves (the equivalent to Kuznets curves depicting the relationship between per capita income and inequality) is found to be rather weak in the empirical literature.[7] While environmental damage may in some sectors have decreased in developed countries, harmful activities have often been shifted to developing countries. Considering the closed world economy it can therefore hardly be argued that growth can reduce environmental degradation (Common and Stagl, 2005: 247ff).

[5] The reports from the Intergovernmental Panel on Climate Change (IPCC) provide an in-depth analysis of these issues. See Chapter 4, "Changes in Impacts of Climate Extremes: Human Systems and Ecosystems", in the recently published special report on "Managing the Risks of Extreme Events and Disasters to Advance Climate Change Adaptation (SREX)" (IPCC Intergovernmental Panel on Climate Change, 2012).

[6] This finding has been contested and qualified in recent empirical studies (see Tichy, 2013, for an overview over recent empirical results).

[7] Most importantly, the majority of the empirical studies investigating the impact of per capita income growth on CO_2 emissions conclude that the environmental Kuznets curve hypothesis does not hold for CO2 emissons. Decoupling of environmental deterioration from growth has been found for local and less important environmental problems (Antal and van den Bergh, 2013).

2.3.3.3. Conclusion

Recent discussions surrounding degrowth focus on the issue of defining what *it* is that actually has to de-grow and how to measure progress in this direction. Five main areas may be distinguished (van den Bergh, 2011): GDP degrowth, consumption degrowth, work-time degrowth, radical degrowth, and physical degrowth. While radical degrowth "may involve changes in values, ethics, preferences, financial systems, markets (versus informal exchange), work and labor, the role of money, or even profit-making and ownership," physical degrowth "can be defined as a reduction of the physical size of the economy, notably in terms of resource use and polluting emission[s]" (van den Bergh, 2011, p. 884).

Critical assessments of degrowth highlight the difficulty of delineating the concept thoroughly and concretising it as no precise definition exists. The fact that it remains unclear what has to de-grow (see the five interpretations above) has also received some criticism. van den Bergh (2011) finds that the degrowth debate is lacking clear policy proposals; in his view it is unlikely to "influence the mainstream" due to its imprecise yet radical approach (van den Bergh, 2011).

Proponents of the degrowth concept, however, view it as a multi-faceted framework for a smooth transition to a society with reduced throughput and do not find it useful to limit the concept to one particular variable or area that has to de-grow.[8] Sustainable degrowth is an "umbrella vision" (Kallis, 2011), combining a number of specific policies, such as reduction of working hours, institutional guarantee of minimum health and economic security (e.g. basic income), labour policies encouraging more employment in sectors where human contact adds value (health, education) and allowing for less productivity in others, salary caps, as well as regulatory bans on harmful activities, such as resource extraction, but also advertising (Kallis, 2011).[9] An important conceptual constituent is that a reduction of working hours and salaries, leading to a reduction in consumption, does not imply lower quality of life. On the contrary, human well-being is increased through gains in leisure time, equality (regarding income, resources, opportunities, etc.), and even more importantly, through the reduced environmental damage associated with material consumption. The vision is a society with increased social justice, ecological sustainability and well-being (Pirgmaier, 2012). It is viewed as a radical yet necessary political project, requiring far reaching cultural and political changes (Kallis, 2011).

2.3.4 A-growth

The discussion of the relationship between environmental sustainability and economic growth brought about another growth-critical concept, termed "a-growth". This concept calls for actively ignoring information provided by the GDP indicator and therefore being indifferent to (or "agnostic" about) economic growth. This will free economic, social and environmental policies from the constraint to yield ever higher economic growth, allowing them instead to aim at higher social welfare (van den Bergh, 2011).

2.3.4.1. GDP Criticism and the Call for "A-Growth"

Motivated by the current criticism of the GDP indicator, which is questioning its usefulness to capture social welfare, van den Bergh[10] developed the a-growth approach, which releases policy makers from having to assess the effect of each proposed policy on economic growth. The growing literature providing evidence for the inadequacy of GDP as a measure for social welfare highlights the need to reassess which policy conclusions are drawn from changes in GDP growth (Stiglitz, Sen, and Fitoussi, 2009). Arguments against the primary use of GDP as an indicator to measure progress, such as the importance of other factors than individual

[8] Note that Kallis (2011) emphasises that the focus does not lie on GDP degrowth per se. The reduction of throughput however is incompatible with economic growth and will likely entail GDP degrowth.
[9] Kallis (2011) proposes an extensive list of policies associated with degrowth.
[10] The following draws on van den Bergh (2009; 2011); van den Bergh and Kallis, 2012.

income affecting welfare and happiness that are left out by the GDP indicator or its insufficiency to measure all social costs since external costs are omitted, have been brought forward by many authors. In the meantime, numerous approaches have been suggested in the literature to replace or complement GDP as the central indicator for welfare; all of which are, however, confronted with valuation, weighting and aggregation problems. That the severe criticism of GDP has not yet led to an improvement of the measure or to a critical reflection on its usage among mainstream economists, can be regarded, according to van den Bergh (2009), as paradoxical. Economists seem to accept the criticism that GDP is not adequately capturing human welfare and progress but obviously deny its relevance. More importantly, critical reflection of the GDP indicator has not yet led to the abolition of the growth paradigm. This aggravates the implementation of much needed policies to resolve important problems related to climate, labour, health and public utilities. Would an a-growth view be adopted and information provided by GDP ignored, policy-makers would be free to solve the problems in these areas without having to provide for growth at the same time (van den Bergh and Kallis, 2012).

2.3.4.2. Policy Package

Specifically, the acceptability of the following two policies can be expected to increase if growth is no longer perceived as the paramount policy goal. First, “a large-scale transition from fossil fuel to renewable energy sources” would no longer be constrained by unconditional growth. The resources involved in such a transition are characterised by lower productivity and lower energy concentration. Since current growth implies high energy and material use, leading to high pollution levels, a transition to renewable energy sources will translate into lower productivity and therefore lower growth of the economy. By removing growth as the policy goal with highest priority, the a-growth view removes obstacles to environmental regulations potentially involving lower economic productivity. Welfare will be unharmed as growth in developed countries is contributing little to increases in welfare (van den Bergh and Kallis, 2012).

Second, the currently high rates of unemployment could be combated by different policies if economic growth was no longer perceived as the single path to full employment. According to the a-growth view, freeing policy makers from the unconditional priority of growth might reveal new solutions to address problems such as unemployment. Different work-time concepts, involving reductions in working time instead of higher incomes and more consumption may be more appropriate in response to productivity increases (van den Bergh and Kallis, 2012, van den Bergh, 2011).

The a-growth policy package also includes regulations on advertisement, research on individual pro-environmental behaviour,[11] ignoring the GDP indicator in economics, politics and public debates, and “technology-specific policies” to avoid lock-in of harmful technologies (van den Bergh, 2011). Indeed, one crucial question the a-growth approach raises is how individual behavior and preferences can be influenced and changed in a way that stagnating or even decreasing incomes and consumption meet broad and general acceptance.

2.3.4.3. Conclusion

A-growth calls for prioritising environmental and social policies that increase welfare over the “growth no matter what” doctrine. While degrowth is not explicitly called for, a-growth might involve negative growth in some sectors, for example in those with high pollution levels. The growth doctrine should, however, not be traded for an anti-growth doctrine. It rather seems worthwhile to attempt at securing broad support from the general public for an a-growth approach. Considering the various growth-critical concepts, a-growth may be most apt to

[11] This can motivate people to limit environmentally damaging behaviour patterns (e.g. reducing consumption of certain harmful goods).

influence the mainstream and facilitate a transition of societies towards a sustainable future (van den Bergh, 2011).

2.4 Innovation

A central driver of economic growth is innovation. Joseph Schumpeter first drew attention to the role of innovations in economic theory in 1911 with his book "Die Theorie der wirtschaftlichen Entwicklung" ("The Theory of Economic Development"). In Schumpeter's view "to produce means to combine materials and forces within our reach…. To produce other things, or the same things by a different method, means to combine these materials and forces differently." Changes in the economy therefore arise from "new combinations of productive means." (Schumpeter, 1934, p. 66). Combination in Schumpeter's view was also "a source of energy within the economic system which would of itself disrupt any equilibrium that might be attained." Hence, innovation-driven growth is an out of equilibrium process. This perspective has been integrated in recent contributions to the theory of economic growth. Weitzman (1998), for instance, conceives of economic growth as a process where technologies inherit parts from other technologies that preceded them. Novel technologies and products then arise by combination of existing technologies. The stock of existing technologies provides the parts for the combination, so the growth process becomes highly cumulative. Schumpeter classified innovations into different types: new products, new methods of production, new sources of supply, exploitation of new markets, and new ways to organise business. In the past thirty years the interest in and the research on innovation within economic theory and policy has grown exponentially. But only in the last few years alternative innovation concepts received more attention. Today the terms ecological and social innovation are well known and rather widely used. In this chapter we want to elaborate on these and other important innovation concepts relevant within the context of socio-ecological transition and the design of a new growth and development path for Europe.

2.4.1 Innovation: Concept and Definitions

Innovation is generally associated with the market introduction of novel products and processes by business enterprises. This type of innovation is frequently referred to as *technological innovation*. However, the technological artefacts these companies introduce in the market are typically complementary to or dependent on the operation of social systems such as business organisations. For instance, the successful introduction of a new product depends also on the organisational capabilities of a company to produce it, of its marketing department to link the features of the new product to specific preferences of potential customers and so forth. Changes in these organisations themselves may lead to cheaper or better products if for instance the support for a product is improved or efficiency gains in the organisation of production allow for price reductions.[12]

Hence, innovation is a collective process as the development and market introduction of new technologies requires a hierarchical and functional division of labour inside but also across companies (cf. Lazonick). The Oslo Manual of the OECD follows to some extent this view and defines innovation very broadly as "... the implementation of a new or significantly improved product (good or service), or process, a new marketing method, or a new organizational method

[12] The historian Thomas Hughes (in Bijker and Pinch, 1987) on the other hand emphasizes that whether a (large scale) innovation project results in a finished viable design depends to a high degree on the larger network of interests surrounding it: its engineerings, funding bureaucracies, sponsors and other participants who are affected by the finished work.

in business practices, workplace organisation or external relations" (OECD, 2005, p. 46). The outcome of innovation is higher quality and/or lower cost products than were previously available at prevailing factor prices (Lazonick, 2013). The definition of the OECD makes clear that this outcome can be achieved in various ways involving also *non-technological innovation*.

Technological innovations can take on several forms: new solutions within given technologies (e.g. improved medical treatments using biotechnology), new technologies in existing technological domains (e.g. new biotechnological procedures that replace prior biotechnological procedures), or new technologies in new technological domains (the development of recombinant DNA technology as the key technology for biotechnology); where the first type is generally viewed as incremental innovation, the second type as disruptive, and the last type as radical innovation. To capture these aspects the OECD Oslo Manual distinguished between new or significantly improved products or processes introduced in the world market.

When defining the term innovation a distinction between the innovation itself and the invention that precedes it has to be made. While invention is the first occurrence of an idea for a new product or process, innovation is defined as the first commercialisation of an invention. There is a strong linkage between these terms, but they belong to different phases of the innovation process.

The process of invention and the subsequent market introduction of a new technology is also the result of the expectations firms have on the potential yields of an investment. They will invest into the development and the market introduction of new technologies if they grasp an opportunity to gain supra-normal profits. Traditional growth theory therefore considers innovation to be induced, i.e. innovation is viewed as the result of an investment decision of a firm acting in a specific natural and institutional environment that imposes some constraints. If these constraints take on the form of specific labour or resource shortages, they will bias the firm's decisions to invest into innovation systematically towards more labour- or more resource-saving technologies; alternatively if resources or labour is abundant theory innovations should have more labour or resource using characteristics (Binswanger and Ruttan, 1978).

This view of induced innovation and the resulting technological bias in economic development is deemed not to be an adequate picture of inducement mechanisms to invest into innovation by several authors, even though it has prominently discussed in the literature in relation to skill-biased technical change (Acemoglu, 2002). While constraints imposed by the natural, social and institutional environment certainly act as focusing devices inducing innovation investment, innovative firms act to overcome these constraints and not so much simply take these as given. For instance, Olmstead and Rhode (1993) have argued that if capital is the means by which labour can be made cheap, then production might be very capital intensive despite labour being cheap (see also Reinstaller, 2007). This implies that innovative firms rely on strategy, their organisation and finance to transform technologies and markets in order to achieve highly profitable and exclusive market positions. Innovation is therefore often induced, but induced innovation transforms rather than accommodates constraints.

Innovation is also cumulative. This cumulative character derives from the fact that technologies are generally recursive in nature: the large majority of technologies consist of other technologies and they are often embedded in larger technological systems. So, when a novel technology enters the economy, it calls forth novel arrangements in terms of complementary technologies or organisational forms needed for them to work properly, and these new arrangements in turn may cause new problems and call for additional adjustments (Arthur, 2009). Hence, technologies and technical change have a systemic character. For this reason, the more

systemic the character of an innovation, the longer are the time lags investors have to sustain until these investments generate new products and yield financial returns. This latter aspect is of particular importance in the context of socio-ecological transitions.

Finally, innovation is also substantially uncertain: A firm investing into innovation faces technological uncertainty, market uncertainty and competitive uncertainty (Scherer, 1999). *Technological uncertainty* derives from its systemic character and the nature of the problems an innovation has to solve. The systemic character increases uncertainty as unforeseen feedbacks to other components of a technological or social system can make their development difficult if not impossible or exceedingly expensive. Technological uncertainty is of particular relevance in the phase of invention if existing or new solutions are not suitable to solve a specific problem a firm tries to solve. A company faces *market uncertainty*, as it is difficult to derive priors on the eventual extent of the market, developments on the demand side that may affect the price policy and as a consequence the returns to innovation. Finally, there is *competitive uncertainty* as there is the possibility that a competitor is able to outcompete the newly developed product and therefore destroy the value of the own investment. To sum up, innovation is

- a collective process that involves the development and deployment of new technological artifacts (products and processes) and of new strategies, or new social or organisational arrangements (non-technological innovations),
- a process of purposeful problem solving seeking solutions to overcome existing constraints, and this process involves the search, development and deployment of new strategic combinations
- a cumulative process implying systemic adjustments in technological, social or organisational systems and therefore causing at times considerable time lags between initial investment and the generation of financial returns, and
- an uncertain process, as innovators face technological, market and competitive uncertainty.

Several new innovation concepts of and accordingly new terms for innovations have been introduced in the literature in the last decades. The new aspect of these approaches is that they include social and environmental dimensions. The most discussed terms are ecological, environmental, green and social innovations, which may be summarised under the heading “sustainable innovation”. Sustainable innovation, broadly defined, includes an economic, an environmental and a social dimension (Tietze, Schiederig, and Herstatt, 2011).

2.4.2 Sustainable, Eco/Ecological, Environmental and Green Innovation

There exist numerous definitions for the different types and dimensions of sustainable innovation, but no consensus which ones should be preferred. Most definitions include economic and environmental aspects. While the environmental dimension of an innovation refers to a reduction in the negative impact of the product or process on the environment, the economic dimension, on the other hand, represents an increase in business value (profits). The most commonly used among these new terms is ecological innovation, or eco-innovation. Fussler and James (1996) are among the first authors who defined eco-innovation as “new products and processes that provide customer and business value while significantly decreasing environmental impacts”. The distinguishing feature here relative to the definition of (business) innovation is environmental gain (compared to relevant alternatives).

Some recent research efforts have led to a convergence in the definition and the understanding of eco-innovation. For instance, Kemp and Foxon (2007) define eco-innovation as “the production, application or exploitation of a good, service, production process, organisational structure, or management or business method that is novel to the firm or user and which results, throughout its life cycle, in a reduction of environmental risk, pollution and the negative impacts of resources use (including energy use) compared to relevant alternatives.”

Similarly, the eco-innovation expert panel of the SYSTEMATIC project (see Reid and Miedzinski, 2008) has defined eco-innovation as “the creation of novel and competitively priced goods, processes, systems, services, and procedures designed to satisfy human needs and provide a better quality of life for everyone with a life-cycle minimal use of natural resources (materials including energy and surface area) per unit output, and a minimal release of toxic substances”.

Eco-innovation encompasses novel or significantly improved solutions introduced at any stage of the product or service life (‘from cradle to grave’). The life-cycle of a product is given particular attention in both definitions. Hence, so-called ‘end-of pipe’ or curative technologies are, however, the least efficient solutions from the point of view of these definitions.

A key feature of both definitions is also the importance they give to resource and energy efficiency as preventive measures to minimise material inputs and decrease levels of waste throughout the production and use process (Hinterberger, et al., 1997; Hawken, et al., 1999; Huber, 2008). By recognising the limits of the natural resource base, the definitions also imply that technology alone cannot be a solution to the problem of sustainability and thereby implicitly integrate the dimension of final consumption, as well.

An important difference of these definitions with regard to the characteristics of business innovations are the motivation of the innovation (putting into the equation also environmental gain) and the analysis of the reduction in the environmental impact (Tietze, Schiedering, and Herstatt, 2011). Despite these definitions outlined above one of the most challenging difficulties is to evaluate what a true ecological innovation is. Therefore a full life cycle analysis of the innovation has to be undertaken, to test if a reduction in the negative environmental impact of a product or process does indeed take place.

The analysis of ecological and sustainable innovations is crucial because they are an indispensable driver of green growth and development (Aghion, Hemous, and Veugelers, 2007). Given the systemic nature of innovation eco-innovation should be analysed on three levels:

- micro (product or service, process, company);
- meso (sector, supply chain, region, product system/service system);
- macro (economy-wide: nation, economic blocks, global).

In addition, as innovation does not only refer to technological artifacts or processes, Kemp and Foxon (2007) also advance a typology of eco-innovation. They distinguish between *environmental technologies*, *organisational innovation*, *product and service innovation with environmental benefits*, and *green systems changes*. New environmental technologies in their view are process technologies and measurement technologies used for environmental purposes. Organisational eco-innovations are instead new organisational methods and management systems dealing with environmental issues (e.g. pollution prevention schemes, environmental auditing). Product and service innovations with environmental benefits are instead new or improved products and services that are environmentally beneficial (e.g. energy

efficient houses), whereas green system changes are alternative systems of production and consumption that are environmentally more benign than existing systems such as biological agriculture or energy systems based on renewable energies.

The views on how to support eco-innovation through public intervention differ considerably. For instance, the United Nations Environment Programme (UNEP) states that eco-innovations can be fostered by environmental regulation and pricing of resources (UNEP United Nations Environment Programme, 2013). For developing countries development towards a "green economy" does not operate via innovation itself, but rather via the enhancement of diffusion of knowledge. Policies have to be designed to enable firms to better identify and adapt already existing green technologies (UNEP Green Economy Briefing Papers, Innovation).

Other authors instead argue that innovation policy supporting eco-innovation should be viewed and conceived as a "third generation" innovation policy (Reid and Miedzinski, 2008). Such a policy should not only focus on the short-term needs of economic growth, but also on long-term sustainable development. Hence, eco-innovation policy should work towards the enhancement of the competitiveness of enterprises, but in doing so it should seeks to avoid negative side effects for the natural environment.

2.4.3 Social Innovation

The importance of social innovation for economic growth and well-being started to draw considerable attention only in the last decade. Especially since the outbreak of the financial and economic crisis in 2008 policy maker have called upon social innovation as a means both for social renewal but also for the private provision of social welfare service by non-profit organisations and social entrepreneurs generally referred to as the "third sector".

The term "social innovation" has been used in a somewhat inflationary way and with no clear cut notion of what it actually means. There exists no generally accepted definition of the highly debated term social innovation. For instance, as early as 1966 Kuznets referred to "social innovations" as all types of innovations that were not linked to the development and deployment of new technologies. Very much in this line, Franz, Hochgerner, and Howaldt (2012) define social innovations as new, more effective or more efficient social practices with social means and social ends. This basically reflects the common definition of innovation, but explicitly related to society, with a social purpose and outcome. Some authors argue however that all innovations have some social purpose and some social impact, which cannot be separated from the whole innovation process, thereby making a separate analysis of social innovations redundant (Pol and Ville, 2009).[13] Rüede and Lurtz (2012) on the other hand argue that past work on social innovation is based on very diverse understandings of what social innovations actually are, using categories that are ill defined and thus leading to an incoherent body of research.

There is also considerable confusion in the use of the term "innovation" in this context. For instance, Hochgerner (2013) emphasises that social innovation is distinct from social change. Social change in the view of this author is the process of change in social structures, institutions, behavioural patterns, culture and states of consciousness, which can either happen in a controlled way driven by policy intervention, or rather unintentional, without intervention by

[13] The implementation of the Internet was a technological innovation with a major social impact leading to major social innovations over the last twenty years drastically changing social behaviour (e.g. communication) of the majority of the society. The purpose of the Internet was also an inherently social one, namely to facilitate communication amongs scientist spread all around the world.

policy-makers. Social innovation instead should be viewed as a stimulator for social change, but is not the change itself. As innovation is always related to a diffusion process, and as innovation is cumulative and recursive the introduction and spreading of some new behavioural patterns (social innovation) is by definition a process of social change.

Pol and Ville (2009) have identified four conceptualisations of social innovations in the literature. The first conceptualisation equates social innovation with institutional change, the second one views social innovations as being driven by social goals towards the improvement of the quality and the quantity of life (longevity), the third defines social innovation as the provision of public goods undersupplied by both the private and the public sector, and the fourth describes social innovations as being concerned with the satisfaction of needs not addressed by the market through non-business innovations.

Rüede and Lurtz (2012) provide an extensive review of the literature and they try to classify the different contributions in terms of the different meanings the authors of the reviewed papers attach to social innovations. In total they identify seven distinct meanings. We will however, focus only on the two most prominent approaches. In the first approach the meaning of social innovation is *"to do something good in/for society"*. It currently dominates the debate on social innovations. Authors using social innovations in this connotation emphasise that goods and services that meet some social need can improve the quality of life (e.g. Mulgan, et al. 2007; BEPA, 2011; OECD, 2010B). Despite its clear normative implication proponents of this approach typically avoid explicit normative statements as to how the quality of life can be improved by arguing that the users of these goods and services know their needs best. Hence, it is not policy to decide what goods and services to provide but social entrepreneurs will provide them.

Social entrepreneurs in turn are essentially people that are dissatisfied with some status quo especially in the context of the provision of social welfare service and take action themselves. In doing so, they have to develop business models on how to best reach other potentially dissatisfied people. What distinguishes them from profit-oriented entrepreneurs in the business world is that they are not motivated by profits but rather by social goals. In the process of introducing the social innovation on the "market" they face however essentially the identical problems profit oriented innovators do. These entrepreneurs therefore satisfy the role of search agents in a discovery process in which through trial-and-error experimentation is introduced in the domain in which typically the public sector would become active. Their domain of search can be limited to needs of some vulnerable social groups, or it can encompass broader social challenges society faces as a whole, or try to establish systemic reforms of societal configurations (BEPA, 2011).

The second approach which Rüede and Lurtz (2012) identify associates social innovation with *"a change in social practices and/or structures"*. The main characteristic of approach is that it regards social innovations as changes in social practices. The central aim of this approach is therefore to better understand how people interact among each other and organize their life in relation to each other, and how this changes over time. The invention of money, the granting of property rights, the nation state, and the Humboldtian university are social innovations according to this approach. Other very broad and diverse examples are laws such as constitutions, civil rights legislation, and traffic laws; organizations such as service clubs, YMCA, and Alcoholics Anonymous; products such as credit cards; and practices such as vacations, and voluntary blood donations. However, the example of Benjamin Franklin has shown that also in such social innovations social entrepreneurs, i.e. individuals that identify a need, and

efficiently organise the developments of models and their deployment (cf. Mumford 2002) may play a paramount role.

The principal difference between these two approaches is that the first one views social innovation and social entrepreneurs as a means to some policy goal. It is mostly driven by the normative interest to develop and deploy policies needed to tackle some urgent social need. The second approach takes instead a more an analytical stance and tries to identify mechanisms of change. Given the recursive nature of innovation any change in the social domain, be it induced by social entrepreneurs or evolving gradually over time through social interaction and changes, or whether it implies changes on how society deals with vulnerable groups or tackles major societal challenges, will lead to a broader change in the institutions of a society. Hence, Reinstaller (2013) argues that all these different notions of social innovation can be accommodated in a more general framework of social and institutional change.

It is important to understand social and institutional change especially in the context of eco-innovations. Arundel, Kanerva, and Kemp (2011) argue that especially in the context of green system changes (see sect. 2.3.2) social innovation may play a crucial role. In this type of eco-innovations a substantial change in user practices, social institutions or other cultural adjustments are necessary to embark on a new socio-technical trajectory. The WBCSD (2010), therefore emphasizes the need to better understand general behavioural motivations in order to trigger behavioural change in different economic domains such as consumption, while also focussing on the role of changes in business structures and culture, new business models, more interaction between customers and businesses (users and producers)[14]. It also considers new partnerships between businesses, civil sector, public sector and academic organisations important in tackling many of the challenges around energy and material use. It also points out the importance of social innovation, for example, to create new business models, new customer behaviour and new ways of interacting between providers and users.

An example is organised car sharing where people do not own a car and consequently do not use a car for most of their trips. For instance, a change could occur here if the majority of people started to use bicycles and public transport instead of a car, for instance through social innovations that lead to changes in company and public/municipal strategies and transport planning. Given that innovations are cumulative and recursive in character, this would require that public transport companies would need to provide attractive alternatives to car drivers in addition to traditional public transport users. All this would require substantial changes first in the views people have on the transport problem, and then in the behavioural norms that determine the demand for transport services. Such changes would not require substantially new technology or infrastructure, but considerable adjustments in the way people and businesses, but also public administrations behave. Arundel, Kanerva, and Kemp (2011) therefore define *social innovations as significant change in user practices and social institutions but as minor changes (if any) in technology, other than new organisational forms or business models*.

To sum up, an exact definition of social innovation is still missing and further research with the aim of concretising this concept and its implication for welfare, well-being and a more sustainable growth and development path is needed. Nevertheless, some main characteristics for social innovations can be derived from the existing literature, which allow the use of this concept for further discussion and research in this project. The main properties of a social innovation are that it induces change of behaviour (social change) in a large part of the society

[14] WBCSD (2010). *Vision 2050 - The new agenda for business.* World Business Council for Sustainable Development.

and that it is intended to serve a social need, although the innovation can be technological in its nature and motivated economically.

2.4.4 European/International Context

According to the Europe 2020 objectives innovation and research are key drivers of social and economic welfare and environmental sustainability. The European Commission Green Paper (2011) emphasises the importance of fostering investment in innovation and points out the problem of decentralised innovation funding in Europe. An important aspect of reforming innovation systems would be to better link the societal and political objectives with research and innovation. At the end of 2011 the successor of the Environmental Technologies Action Plan, the Eco-innovation Action Plan, which aims to foster eco-innovation and enhance cooperation in this sector in Europe, was introduced by the European Commission.

Also the OECD acknowledges the importance of innovation for achieving social goals: “Innovation can occur in any sector of the economy, including government services such as health or education. However, the current measurement framework applies to business innovation, even though innovation is also important for the public sector. Consideration is being given to extending the methodology to public sector innovation and innovation for social goals.” (OECD, 2010B)

2.5 Welfare/Well-being

The achievement of individual and societal well-being is the main objective of economics. Traditionally economists measure society’s welfare in terms of the scale of economic activity. Higher consumption growth has been perceived as synonymous with higher levels of welfare. However, the possibility of economic growth to increase human well-being is increasingly put into question. On the one hand, human economic activity is causing considerable damage to the natural environment, the effect of which has been pronounced in the recent years by extreme weather conditions, ecological degradation and an increased scale of resource extraction. On the other hand, the failure of financial markets, lengthening recessions and pronounced increase in income disparity within and between countries has threatened the well-being of many populations. An increasing number of studies have recognised the importance of social and psychological factors to well-being, in addition to the solely material ones. Tim Jackson points that “[t]o do well is in part about the ability to give and receive love, to enjoy the respect of your peers, to contribute useful work, and to have a sense of belonging and trust in the community. In short, an important component of prosperity is the ability to participate freely in the life of society.” (Jackson, 2009, p. 30). There has been increasing concern that a more encompassing measure of well-being needs to be developed, which not only captures economic well-being, but human well-being in a broader sense.

2.5.1 Concepts and Definitions

Alfred Marshall was the first economist to relate the science of economics to the study of well-being. However, Marshall limits the scope of economics to the solely material conditions of well-being. He defines economics in terms of “that part of individual and social action which is most closely connected with the attainment and with the use of material requisites of wellbeing” (Marshall, 1890). In a similar vein, Pigou famously defined economic welfare as ‘that part of social welfare that can be brought directly or indirectly into relation with the measuring-rod of money’, emphasising the role of economics as a study of material well-being only (1952: p. 11). The economic factors contributing to well-being have long been recognised by academics. In the neo-classical perspective welfare has been largely associated with the satisfaction of material human needs. Accordingly, increase in wealth and, thus, consumption, has been perceived as the primary driver of welfare.

Most researchers now agree that well-being is a multidimensional concept (Diener, et al., 2009; Michaelson, et al., 2009; Stiglitz, Sen, and Fitoussi, 2009). Various dimensions of well-being have been widely discussed in the academic literature. Studies which combine findings from psychology, sociology and economics have shown that non-material aspects of people's life are relevant for well-being, these generally include social and family relations, work, leisure, health and the achievement of personal goals, as well as the feeling of meaning and purpose (Layard, 2006; Frey, 2008; Frey and Stutzer, 2002A).

Accordingly, well-being has been more broadly defined as a state of material but also psychological (immaterial) satisfaction. The terms well-being, happiness and life satisfaction are often used interchangeably by academics (Frey, 2008). For the purpose of this paper we will focus on the notion of well-being as a comprehensive approach to understanding human happiness.

There is some overlap between the concept of well-being and the neo-classical concept of welfare. However, they also differ considerably. The major difference comes from the neoclassical concern with material living conditions and market efficiency, while studies on well-being focus on the subjective sense of life satisfaction among citizens.

While no concrete definition of well-being exists, two dimensions have been largely recognized by academics - objective well-being (OWB) and subjective well-being (SWB).

Objective Well-being

Theories on OWB attempt to measure well-being using a list of pre-selected objective indicators. The main issue in this approach is how to choose the most appropriate indicators. Sen's capabilities approach, which will be discussed in more detail below, is an example of an objective theory of well-being. OWB is traditionally concerned with the satisfaction of physical and social human needs. The most widely discussed determinants of OWB are education, leisure time, disposable income, life expectancy, nutrition and health status. All these factors have been found to directly affect the quality of life of individuals. In terms of operationalisation of the objective theories, measures of well-being are based on quantifiable indices, generally consisting of social, economic and health indicators (UNDP, 1998). As an example, the UN's Human Development Index relies on three objective indicators to measure quality of life, namely life expectancy at birth, educational attainment and GDP per capita.

There are certain weaknesses of the objective approach, which have been largely discussed in the academic literature (Diener, et al., 2009). First of all, it is problematic to decide top-down which particular factors should constitute a measure of well-being. Second, it is questionable how to weight the different components of objective indicators (Diener, et al., 2009). Third, OWB measures have been criticized for being "paternalistic" and overlooking cultural and individual differences, since the same set of indicators are applied universally (Smith, et al., 2001).

Subjective Well-being

In contrast, SWB theories are based on the notion that people are the best judges of their own happiness (Frey and Stutzer, 2002B). The subjective approach traditionally focuses on individuals' self-reported levels of happiness, satisfaction with life, positive feelings and the absence of negative feelings (Diener and Lucas, 1999). According to Diener: "subjective well-being refers to all of the various types of evaluations, both positive and negative, that people make of their lives" (Diener, 2006: 399-400). Data on subjective well-being is gathered through surveys and interviews on life satisfaction, which allows individuals to assess their own condition. It has been stressed that SWB indicators are essential to understanding comprehensively the well-being of individuals, since such indicators capture factors which have been omitted by objective measures, but which people perceive to be important in their lives (Layard, 2006).

Although the SWB approach provides a useful framework for understanding individual well-being, it has been recognised that subjective indicators cannot be entirely reliable. The self-reported level of well-being is likely to be affected by various factors, such as the circumstances during the interview (for example weather conditions), the formulation of the questions and the mood of the participants (Schwarz and Strack, 1999). Moreover, there is some evidence that cultural and language characteristics may further influence the results of subjective studies (Wierzbicka, 2004), as well as genetic factors and personality traits (Ryff et al, 2004).

The Economics of Happiness

A new field in economic research has attempted to combine findings from various disciplines in order to provide a comprehensive understanding of well-being – happiness economics. Frey and Stutzer (2002A) employ an interdisciplinary approach to the study of happiness in a famous book "Happiness and economics: How the economy and institutions affect human well-being", drawing insights from psychology, economics, sociology and political science. The authors demonstrate that micro- and macro-economic conditions, such as income, unemployment and inflation, affect individual well-being. The level of democracy and the quality of institutions have also been reported to play a role in individual happiness. In another influential book, "Happiness: Lessons from a new science", Layard (2006) mentions seven factors that have been found to influence well-being most significantly: family relationships, financial situation, work, community and friends, health, personal freedom and personal values. Accordingly, subjective measures of happiness, in addition to the material ones, have been embraced by many academics as adequate measure of individual well-being.

2.5.2 Approaches to the Concept of Well-being

Amartya Sen (1984) offers a highly influential discussion on the determinants of well-being in a breakthrough essay titled "The Living Standard". Sen identifies three approaches to the concept of well-being, broadly defined in terms of *opulence*, *utility* and *capabilities for flourishing*.

Opulence

The concept of opulence corresponds to the notion that well-being is served by materialism. Opulence refers to the amount of material commodities readily available for consumption. Traditionally, an increase in the volume flow of commodities has been associated with improvements in well-being (Jackson, 2009). Tim Jackson (2009) stresses the limitations of the opulence approach, recognised in economic theory itself through the concept of "diminishing marginal utility" of goods, which refers to the fact that the level of additional satisfaction gained from the consumption of a certain good decreases with an increase in the level of consumption of the respective good.

Utility

The second approach focuses on the satisfaction delivered by commodities. In economic theory the satisfaction gained through the consumption of goods is expressed in terms of utility, which stands for a measure of well-being. Measuring utility is problematic since the use of commodities has social and psychological dimensions rather than purely material ones. To get around this problem, economists assume that the value of commodities is equal to the price people are willing to pay for them in competitive markets. In that sense, utility from consumption is measured by the monetary value of commodities exchanged in the market. Since GDP aggregates the value of all commodities exchanged in the market, it is perceived as a proxy for the overall level of utility. This provides justification for the conventional belief that higher GDP

levels, corresponding to higher spending and consumption in the economy, are associated with an increase in societal well-being. However, the notion that GDP can serve as an adequate measure of well-being has received considerable criticism in the academic literature. Some studies on the issues will be discussed below.

Freedoms and Capabilities

The third approach to well-being offered by Amartya Sen stands in contrast to the previous two, which focus solely on the role of commodities in human capacity to live well. Core focus of the third approach are the functionings and capabilities of individuals as determinants of human well-being. Functionings are conceived as a collection of the observable *achievements* of each person such as "their health, knowledge or having a meaningful job" (Stiglitz, Sen, and Fitoussi, 2009, p. 151). Capabilities, on the other hand, are defined as the extent to which people have the opportunity and freedom to choose and pursue the life they value (Sen, 1984).

Tim Jackson (2009, p. 35) points out that "[a] prosperous society can only be conceived as one in which people everywhere have the capacity to flourish in certain basic ways." Defining these basic "entitlements" for flourishing is a difficult task. Sen himself does not offer a specific list of capabilities which need to be protected by societies. Martha Nussbaum (2000) attempts to collect the most important necessities for flourishing in a list of ten "central human capabilities". These include: the ability to live the normal length of a human life, to enjoy one's bodily health and bodily integrity, to have opportunities to use one's senses, imagination and thought, to express emotions, to form a conception of a good life, to live with others and to be treated with dignity and equal worth, to play and to have control over one's environment in terms of political life and material goods. The key advantage of this approach is that it provides a universal equality model while at the same time recognizing human diversity. Rather than focusing on equality in outcomes, the emphasis is on providing "real" or genuine choices so that both men and women can realize their full potentials. Academics have argued that what counts towards people's well-being is "physical and mental health, education and democratic entitlements, trust, security and a sense of community, relationships, meaningful employment, and the ability to participate in the life of society" among others (Jackson, 2009, p. 35). Accordingly, it has been recommended that the social and psychological dimensions of well-being need to be given higher priority in the assessment of individual well-being, compared to the solely material conditions of living.

Capabilities and Ecological Boundaries to a Good Life

There are certain limits to our capabilities to live well (Jackson, 2009). First of all, these involve the ecological boundaries of the planet earth. There is only a certain amount of material resources at mankind's disposal, such as fossil fuels, minerals, timber, water and land, which need to be used responsibly. The ecological system is further bounded by the "regenerative capacity of ecosystems, the diversity of species and the integrity of the atmosphere, the soils and the oceans" (Jackson, 2009, p. 35). Secondly, our capabilities to live well are limited by the size of the global population. As the earth becomes more densely populated, mankind gets closer to reaching the ecological limits. It is essential to respect and to live within the boundaries of the natural environment in order to maintain the prosperity of the current and future generations, as well as of mankind's fellow species. Protecting these capabilities for flourishing has been defined as one of the major precondition for achieving a "sustainable economy" (Tim Jackson, 2009, p. 104). Yet, the current level of economic activity poses threats to the functioning of the ecological system. Pollution, over-extraction of natural resources and loss of biodiversity are some of the symptoms of mankind's unsustainable practices.

2.5.3 Relationship between Income and Life Satisfaction

A vast number of studies have investigated the relationship between subjective well-being and income. Some authors have reported a strong delinking between average income and the perceived level of happiness (measured as subjective well-being), while others maintain that income is representative for the level of well-being across countries and over time. Below will be discussed both sides of the argument, as well as research on the role of psychological factors for the satisfaction gained from additional income.

Studies on life satisfaction have generally found that within a given country an increase in the income level is associated with an increase in the reported level of happiness. However, a country comparison has revealed that a rise in the average level of national income is no longer associated with an increase in the reported level of life satisfaction, at least for those countries which have sufficient income to meet the basic needs of their citizens (Diener and Seligman, 2004; Clark, Frijters, and Shields, 2008). This phenomenon has been referred to as the "Easterlin paradox", after a well-known study of the economist Richard Easterlin published in 1974. Further studies have found that life satisfaction has remained relatively unchanged in most of the advanced economies over the last decades, despite a significant growth in GDP. The results suggest that at low levels of development an increase in income will result in higher life satisfaction (Di Tella et al 2003), however once a threshold of about $10,000 per capita is reached an additional increase in income will have little effect on the average level of subjective well-being in the country (Frey and Stutzer, 2002A). These findings cast doubt on the conventional presumption that higher GDP necessarily leads to a rise in societal well-being.

However, some recent research on life satisfaction has questioned the validity of the Easterlin hypothesis. A study by Sacks, Stevenson, and Wolfers (2010) finds a positive association between income and reported happiness across countries and over time. The authors show that average life satisfaction is higher in countries with greater GDP per capita and also that as countries experience economic growth, the life satisfaction of their citizens typically increases. Hence, the results suggest that subjective well-being increases hand in hand with material living standards. Sacks, Stevenson, and Wolfers (2013) do not find evidence for a satiation point beyond which life satisfaction levels out.

It has been recognised in the academic literature that deprivation, income insecurity and financial concerns are among the factors which reduce subjective well-being. However, there are other, psychological factors which play a crucial role in people's perception of happiness, namely *habituation* and *social comparison* (Clark, 2012). *Habituation* refers to the individual adjustment (adaptation) to the higher level of income. According to a study by Di Tella et al (2007) the additional satisfaction from income increase is lost within four years. A similar rule applies to the dissatisfaction from negative events, which is found to depreciate over time (Donovan and Halpern, 2002, p. 24). Accordingly, habituation has been found to be one of the main causes of the "addiction" to income and consumption growth. *Social comparison* is another mechanism through which individual life satisfaction is reduced, even if their standard of living increases. This implies that relative, and not only absolute, income levels matter for well-being. Some behavioural studies have found that people are willing to accept lower absolute income if they are in a higher position relative to others (Solnick and Hemenway, 1998). Clark (2012) argues that social comparison and habituation effects are present not only with respect to income, but also to other factors of economic and social life, such as unemployment, health, etc.

Empirical findings in the literature on life satisfaction largely contradict the neoclassical perspective that well-being (defined by neoclassical economists as utility) depends only on the level of consumption. Frank and Hutchens (1993) argue that providing individuals with lower lifetime earnings could still contribute to higher well-being in case moderate increases to income are applied as well as reasonably uniform distribution between members of society.

2.5.4 Welfare Economics

Welfare economics is the branch of economic theory which attempts to measure and promote social welfare through the efficient allocation of scarce resources (Common and Stagl, 2005). Social welfare refers to the overall welfare of society. With sufficiently strong assumptions, it can be specified as the summation of the welfare of all the individuals in the society. This branch of neoclassical economics views the pure market system as not only being able to solve the problem of resource allocation, but also as being able to provide the best solution according to the concept of Pareto efficiency[15]. This notion is based on the conventional believe that under the condition of perfect competition in the market, individual self-interested behaviour promotes the interest of society and leads to competitive equilibrium.

Welfare economics rests upon two fundamental theorems. The first one states that any competitive equilibrium leads to a Pareto efficient allocation of resources, while the second one asserts that any efficient allocation can be reached by a competitive equilibrium (Common and Stagl, 2005)[16]. However, the outcomes of the analysis are built upon a set of assumptions, which many perceive as unrealistic. The notion that pure market economies are able to promote the welfare of all individuals in the economy has been largely abandoned due to the existence of market failures,[17] resulting from monopolies, external effects, public goods, information asymmetries and others. There has been a general agreement that markets alone cannot deliver allocative efficiency, and that there is the need for state intervention in order to promote the welfare of society. This has given rise to the development of a welfare state as a concept of government in which the state plays a key role in the protection and promotion of the economic and social well-being of its citizens.

The Utilitarian Approach

[15] A situation is defined as Pareto optimal if there is no attainable alternative situation that makes everyone better off.
[16] In competitive equilibrium all individuals and firms maximize utilities and profits respectively.
[17] Market failures are the source of inefficient allocation of resources.

Conventional welfare economics is largely based on the utilitarian approach, as postulated by the British philosopher Jeremy Bentham,[18] according to which the most desirable action is the one which maximises happiness for the majority of the population: “the greatest happiness for the greatest number” (Alkire and Deneulin, 2009). As already mentioned, economists often use the term utility to imply “happiness” or “satisfaction”. Individuals gain utility through the satisfaction of their needs, or preferences, which is viewed as the end goal for their actions. According to the utilitarian approach economic goods should be distributed in a way which maximises overall utility for the whole society (Bojer, 2003). The utilitarian approach perceives individual preferences as the sole basis for assessing a given allocation.

Traditionally, welfare economics captures individual preferences in terms of individual willingness to pay (WTP). This allows extending the scope of monetary measures to non-market aspects of life, such as health, education or exposure to pollution. The cost-benefit analysis is a commonly used method to evaluate the desirability of an allocation by adding up people’s WTP (Stiglitz, Sen, and Fitoussi, 2009). It is often employed by governments in order to evaluate the desirability of a specific policy intervention.

The WTP approach has received considerable criticism. Stiglitz, Sen, and Fitoussi are concerned that “evaluations based on total willingness-to-pay may overlook fundamental inequalities, disproportionately reflecting the preferences of those who are better-off in society” (2009, p. 154). A further problem arises from the comparison of costs and benefits of certain allocations by expressing them in terms of money. An important argument against the practice of monetary valuation is the incommensurability of certain goods and services, especially when these relate to vital environmental functions (Aldred, 2006). Some authors point to the deficiencies of the willingness to pay approach in assessing the value of clean air, the benefits of preserving biodiversity and the price of protecting endangered insects and bacteria, to mention a few. A main problem arises from the fact that individual preferences are likely to outweigh sustainability considerations in situation when the costs are unevenly spread among different groups of the population or experienced long-term into the future.

Evaluating the desirability of an allocation over time constitutes another problem in the willingness-to-pay approach. Normally this would involve estimating and comparing the costs and benefits accruing in different periods in time in order to assess the desirability of a policy intervention (Harrison, 2010). This is done by choosing a discount rate which captures the value of future costs and benefits relative to the value of current costs and benefits. The choice of a discount rate is crucial to the analysis since it can deliver significantly different results regarding the desirability of an allocation. This is especially so when the costs and benefits occur over long periods of time. The lower the discount rate is set, the more it accounts for sustainability deliberations and the higher consideration is given to future costs and benefits. In this case resources are distributed relatively evenly among generations. If the discount rate is set high, future costs and benefits are discounted more heavily, which gives rise to sustainability concerns. This negatively affects the intergenerational distribution of resources as the welfare of future generations is given less priority compared to present ones.

[18] Jeremy Bentham (1776). A Fragment on Government. London., Preface (2nd para.).

2.5.5 Measuring Well-being

2.5.5.1 Improving Resource-based Measures

Deficiencies of GDP-based Indicators

Traditionally economists rely on resource-based indicators, such as wealth, income and consumption, to measure human well-being. Even though resources are essential for meeting human needs and promoting the welfare of society, many authors acknowledge that they are not sufficient indicators for the quality of life (OECD, 2006). Some of the deficiencies of GDP involve its failure to account for activities which are outside the market but are relevant for individual well-being, such as household labour and voluntary work. The effects of externalities, such as pollution, are also ignored in conventional GDP-based indicators. A further problem arises from the fact that GDP contains "defensive" expenditures (such as the cost of a car accident) and spending on "positional" goods (necessary to defend one's social position), which do not contribute to societal well-being (Tim Jackson, 2009). Lastly, GDP fails to account properly for changes in the resource base which affect future consumption possibilities. Hueting illstrates that a decrease in production could in fact enhance social welfare in the case when part of the production is sacrificed in order to obtain a safer environment, at a time when "environmental functions have become scarce goods" (2008, p. 2).

Stiglitz, Sen, and Fitoussi (2009), as leading members of the Commission on the Measurement of Economic Performance and Social Progress set up by the former French President Sarkozy, are concerned with the increasing divergence between the information depicted by aggregate GDP data and the actual factors contributing to the well-being of society. One of the main contributions of the commission has been the proposal of measures to improve existing well-being indicators. In terms of conventional measures of well-being, the Commission suggests that national economic accounts can be improved by shifting emphasis from measuring economic production to measuring individual economic well-being. The Commission advocates that the focus should be on household income, consumption, and wealth, capturing per capita levels but also interpersonal distribution. The report further suggests enhancing conventional measures such as GDP and GNP to take better account of the quality of products and the output of services, which play a crucial role in individual well-being but are not adequately reflected in the system of national accounts.

Furthermore, Stiglitz, Sen, and Fitoussi (2009) emphasise the need to develop a system that goes beyond the sole measures of economic activity and towards a comprehensive measure of wellbeing, which leaves room for sustainability considerations. In contrast to GDP and GNP, which attempt to measure well-being in a single number, a system needs to be based on a plural set of indicators which capture the various aspects and determinants of human well-being. The Commission distinguishes eight key dimensions of well-being that should simultaneously be taken into account: material living standards, health, education, personal activities (including work), political participation, social relationships, environment and security. According to the Commission "[a]ll these dimensions shape people's well-being, and yet many of them are missed by conventional income measures" (Furthermore, Stiglitz, Sen, and Fitoussi, 2009, p. 14). In view of the above arguments, the advantage of using monetary and nonmonetary measures of well-being jointly is the possibility to complement the information captured by each of them.

2.5.5.2 Alternative Measures

Since the 1970s alternative measures of well-being have been developed, based on neoclassical welfare economics and using as a starting point the System of National Accounts. The main rationale behind the new indicators has been the inclusion of non-market commodities, positive and negative, in order to obtain aggregated macro-indicators in monetary terms. Moreover, attempts have been made to incorporate sustainability considerations in the alternative measure well-being.

The *Measure of Economic Welfare* (MEW; Nordhaus and Tobin, 1972) is such an alternative. It adds to national output the value of leisure time and the amount of unpaid work in the economy (which are GDP increasing) as well as the value of environment damage caused by industrial production and consumption (which are GDP reducing). The *Index of Sustainable Economic Welfare* (ISEW; Daly and Cobb, 1989), similar to the *Genuine Progress Indicator* (GPI), adjusts GDP further by incorporating a range of harmful economic activities and by excluding the value of public expenditure on defense.

Further environmental concerns were incorporated into the index of *Environmentally Sustainable National Income* (eSNI; Hueting, et al., 1992). It is defined as the maximum attainable production level by which vital environmental functions remain available for future generations, given the currently available technology. The difference between NI and eSNI gives information about the distance between the current and a sustainable situation. When the distance increases, society is moving away from environmental sustainability, whereas a decrease in the distance signifies that society approaches environmental sustainability.

Most recently attempts to assess the achieved level of human well-being in a given country or region have been inspired (again) and reinforced by the “Welfare Beyond GDP” debate reignited by the Stiglitz-Sen-Fitoussi-Report. In that respect, Sen’s Capabilities approach (Sen 1984; 1999) has been highly influential in directing the focus towards a new and encompassing concept of well-being.

The Capabilities approach has contributed to the design of the *Human Development Index* (HDI), which was launched in 1990 by the United Nations Development Programme (UNDP) and has since become the most discussed measure of well-being after GDP per capita (UNDP, 1990). The HDI attempts to capture human well-being in three major categories: life expectancy at birth, educational attainment, and GDP per capita. It is calculated as the weighted average of the three sub-indices, each of them normalized to take a value between 0 and 1. Critiques argue that the averaging of the three equally weighted components of HDI is problematic, since they represent different concepts (Hopkins, 1991). Others point out that the HDI is based on a very narrow definition of human well-being, does not reflect income inequality within high income countries (Trabold-Nubler, 1991) and overlooks the principle of diminishing returns (Kelly, 1991).

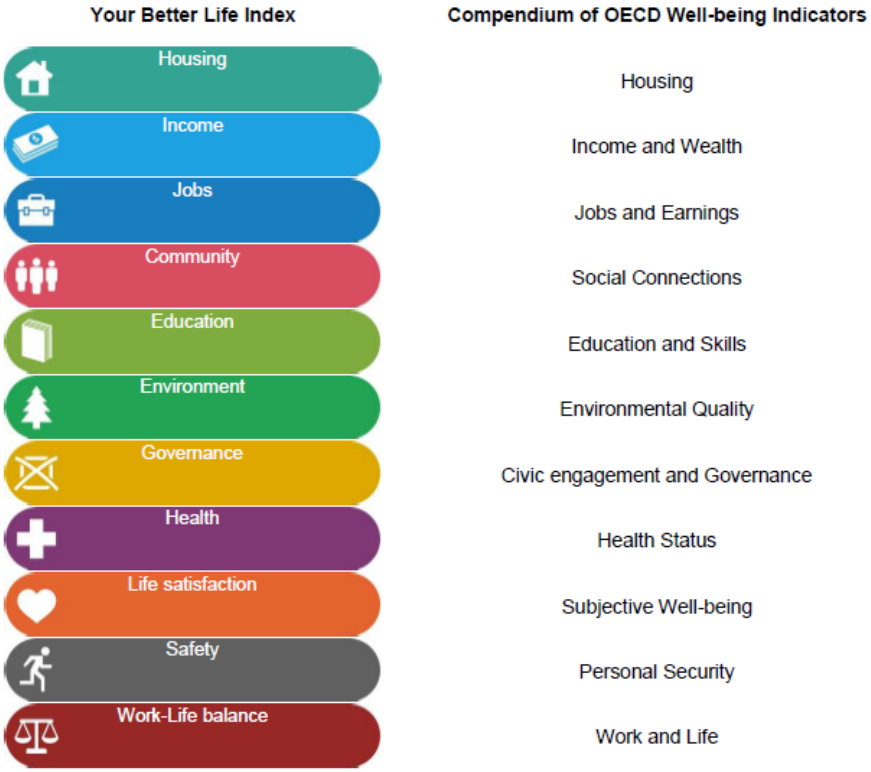
The OECD more recently has been rather influential in bringing alternative measures of well-being to the forefront of international political and economic debate. The development and promotion of indices that provide a comprehensive measure of well-being has been defined as a key priority of the organisation. In May 2011 the OECD launched the “Better Life Initiative” (OECD, 2011B) in an attempt to combine different measures of well-being in an international context. The initiative has been conducted in accordance with the recommendations of the Stiglitz-Sen-Fitoussi Commission. The focus has been on both objective and subjective aspects of people’s well-being, measured in the areas of material living conditions and quality of life. Figure 8 summarises the 11 dimensions of well-being, which the OECD has identified as essential.

As part of the Better Life Initiative, the OECD developed *Your Better Life Index* as an innovative and interactive tool, which allows individuals to assign weights directly to the various dimensions of well-being, according to their own preferences. This permits countries to

assigning different weights to the 11 components of well-being, depending on what their citizens perceive as important in their lives (OECD, 2011B).

In October 2011 the OECD published a report titled “How’s Life?” as part of the Better Life Initiative, which attempted to provide a comprehensive picture of well-being levels in OECD countries and other developed economies (OECD, 2011C). The study focuses on material living conditions, but also on other aspects of quality of life, such as health, work-life-balance, education, social connections, civic engagement and governance, environment, personal security and subjective well-being.

Figure 8: OECD Better Life Index and Well-being Indicators



Source: OECD (2011B, p. 37)

2.5.6 European Context

In August 2009 the European Commission issued a communication titled “GDP and Beyond – Measuring Progress in a Changing World”.[19] As core goal of the communication has been defined the improvement, adjustment and complementation of GDP with indicators which monitor social and environmental progress. The communication presents a road map with five key actions designed to “support the Commission’s aims to develop indicators relevant to the challenges of today”. The following actions have been embraced by the European Commission:

1. Complementing GDP with environmental and social indicators

2. Near real-time information for decision-making

3. More accurate reporting on distribution and inequalities

4. Developing a European Sustainable Development Scoreboard

[19] Available at www.beyond-gdp.eu/EUroadmap.html

5. Extending National Accounts to environmental and social issues

In response to the Communication of European Commission, the European Statistical System Committee (ESSC) launched a Sponsorship Group on "measuring progress, well-being and sustainable development". The major task of this group has been defined as the improvement of existing statistical systems with a focus on the provision of appropriate indicators for well-being and sustainable development. The group prepared a report which was adopted by the European Statistical System Committee in November 2011 (ESS, 2011). The report endorsed the recommendations from the "GDP and Beyond" Communication, narrowing them down into a set of concrete actions in three broader domains: 1. Household perspective and distributional aspects of income, consumption and wealth, 2. Multidimensional measures of quality of life, and 3. Environmental sustainability. A list of indicators and available data sources are included in the report.

2.6 Wealth

Wealth was a central concept in the works of the classical economists; beginning with Adam Smith's „An Inquiry into the Nature and Causes of the Wealth of Nations" (1776) to, e.g., Thomas Malthus' „Principles of Political Economy" (1820), Karl Marx' „Grundrisse der Kritik der politischen Ökonomie" (1858) and Max Weber's „The Protestant Ethics and the Spirit of Capitalism" (1904). Within the context of a socio-ecological transition and the central aim of the WWWforEurope project to lay the foundation for a more sustainable growth and development path for Europe, one important issue is the definition and the concept of wealth and its distribution between the current and future generations as well as within the respective generations. Concerns with regard to the sustainability of the current growth and development path also relate to immaterial/intangible wealth components, as for example an intact environment, i.e. natural capital.

2.6.1 Dimensions of Wealth and Basic Definitions

Since Adam Smith the theoretical distinction between *material* and *immaterial* wealth is made. Only material wealth was regarded by Adam Smith, and basically all other (classical) economists, as constituting a – or rather, *the* – subject of economics. While in Smith's definition of wealth as „the annual produce of the land and labour of the society", the stock and the flow dimension are not clearly distinguished, it is clear in modern economics that the idea of wealth is based on a stock concept, while its returns (basically in the form of labour and capital income) are flows (Stiglitz, Sen, and Fitoussi, 2009). Increasingly it is acknowledged that a country's as well as individual welfare are not only dependent on the flow of incomes derived from wealth, but also on the stock of wealth itself. In the context of the discussion of determinants of (individual) welfare and well-being (which is highly relevant for the WWWforEurope project), the distinction between an "objective" and a "subjective" conception of wealth (Heilbroner 2008) appears of importance. The objective conception of wealth, one of the fundaments of the works of the classical economists, is based on the notion of wealth as tangible goods and their "use-values". The marginalists' subjective conception of wealth refers to the enjoyment derived from tangible goods, less on the goods themselves which are generating the desired "utilities". According to this subjective conception of wealth, no absolute and unchangeable line can be drawn once and for all between goods contributing to wealth and those which are not. A socio-ecological transition may require or result in a respective shift of this line.

Recently the definition of wealth traditionally confined to material wealth components is augmented by immaterial/intangible assets. As Stiglitz, Sen, and Fitoussi (2009, p. 29) in their „Report by the Commission on the Measurement of Economic Performance and Social Progress" state: „To construct the balance sheet of an economy, we need to have comprehensive accounts of its assets (physical capital – and probably human, natural and social capital) and its liabilities (what is owed to other countries). To know what is happening to

the economy, we need to ascertain changes in wealth.“ This statement refers to the World Bank’s *comprehensive* wealth accounts framework , which computes natural and produced capital and adds intangible capital as a residual in the computation of the capital asset base. Intangible capital in the World Bank’s comprehensive wealth concept comprises all non-physical and non-financial assets: “By definition intangible capital includes any asset other than physical capital, natural resources and net foreign assets (World Bank, 2006). It thus includes human capital – the sum of knowledge, skills, and knowhow possessed by the population. It includes the institutional and social infrastructure of the country. It also includes resources omitted in the natural capital calculation such as subsoil water, diamonds, and fisheries.” (Ferreira/Hamilton 2010, p. 5). Within this framework, comprehensive wealth is defined and computed as the discounted flow of consumption, which assumes that the flow of consumption is sustainable.

A critical view on this assumption of a sustainable flow of consumption is the point of departure for the definition of the concept of *inclusive* wealth by the United Nations in its recently published „Inclusive Wealth Report“ (UNU-IHDP/UNEP, 2012). Accordingly, inclusive wealth comprises natural capital (local ecosystems, biomes, sub-soil resources), human capital (education, skills, tacit knowledge, health), social capital and manufactured capital (roads, ports, machinery, buildings, and infrastructure). All these capital assets together form an economy’s productive base producing consumption goods and services contributing to human well-being. The social worth (also called the shadow price) of capital assets is defined as “…the contribution a marginal unit of it is forecast to make to human well-being.” UNU-IHDP/UNEP (2012. p. 18). And further (UNU-IHDP 2012, p. 22): “Wealth is the social worth of an economy’s capital assets.”

Despite the similarities between the comprehensive and the inclusive wealth accounts, there is one fundamental difference: It follows from the different definitions of wealth – comprehensive wealth as present value of a flow of consumption versus inclusive wealth as the social worth of an economy’s capital base – that comprehensive wealth accounts assume sustainable consumption, while inclusive wealth accounts analyse whether consumption is sustainable (UNU-IHDP/UNEP, 2012).

Another important distinction is between *national* wealth (the difference between an economy’s gross wealth and its liabilities towards the rest of the world) and *individual/household* wealth (the difference between gross wealth and liabilities on an individual/household level). Individual/household wealth, which besides income is an important determinant of individual well-being, comprises those assets only that can be attributed to individuals/households. This excludes natural, social and cultural capital as individual wealth components (see Fessler, Mooslechner, and Schürz 2012, also for the following). Individual/household wealth includes physical capital (primarily financial assets, real estate and consumer durables, i.e. non-human capital according to Davies 2011) and human capital. In principle also entitlements from social security (particularly pension) systems can be seen as substitutes for private wealth. However, due to valuation problems, neither on the macroeconomic nor on the individual/household level human capital and entitlements from social security systems, which are both not marketable, are included in attempts to capture and quantify the existing stock of wealth and its distribution.

2.6.2 Measurement Issues

The measurement and valuation of different, heterogeneous kinds of assets or types of capital, respectively, to sum them up to the total amount of a nation’s or an individual’s/household’s overall wealth based on a common denominator – which ordinarily is money – was from the very beginning one of the most fundamental challenges for economists (Heilbroner 2008). Usually, the systems of national accounts of advanced countries include various stock and flow indicators which are considered to reflect a nation’s wealth, e.g. estimates for various kinds of financial and real assets as well as measures for the annual production of goods and services.

The consideration of natural, social and cultural capital in comprehensive wealth accounting, which is increasingly demanded to determine whether an economy is on a sustainable development path as well as to establish welfare and well-being “beyond GDP”, poses additional measurement and valuation problems. This is why up to now these types of capital are not included in the balance sheets of national economies.

Recently some theoretical and practical research has been dedicated to methods how to properly value natural capital. Valuing the environment and the services it is delivering is high on the supranational political agenda. According to the European Commission‘s „Roadmap to a Resource Efficient Europe“ (European Commission, 2011B), natural capital and ecosystem services must be „properly valued and accounted for by public authorities and businesses“, with an implementation goal of the year 2020.

In their “Inclusive Wealth Report” already mentioned above, UNU-IHDP/UNEP (2012) recently presented an Inclusive Wealth Index (IWI), which is mainly based on the methodological approach developed by Arrow, et al. (2012). This IWI shifts the focus from flow to stock accounting. Its improvement (deterioration) signals a sustainable (unsustainable) development as the basis for the well-being of future generations. The IWI and its change in the period 1990 to 2008 are calculated for a group of 20 countries including countries at all stages of economic, social and ecological development. The IWI rests on a large number of key variables used in the measurement of wealth, which can be grouped into variables relating to human capital, to produced capital, to natural capital, and to health capital. In addition, it is adjusted for total factor productivity, carbon damages and oil capital gains, which also influence an economy’s productive base. Table 2 shows the change in inclusive wealth for the 20 countries regarded (annual growth rates) between 1990 to 2008 measured by the IWI per capita. The country ranking resulting from this exercise is compared to the rankings for GDP per capita as the most common, conventional measure of economic progress and for the Human Development Index (HDI), which combines gross national income per capita with life expectancy and expected years of schooling as central indicators for social well-being.

Table 2: Change in Inclusive Wealth for 20 countries, 1990 to 2008, according to IWI

Source: UNU-IHDP/UNEP (2012).

2.6.3 European/International Context

The debate and initiatives aiming at a more comprehensive/inclusive wealth concept as a central element of a sustainable development path are mainly promoted and implemented by international/supranational institutions. The European Commission‘s „Roadmap to a Resource Efficient Europe“ (2011B) already mentioned aims at a proper valuation and consideration of natural capital and ecosystem services by public and private actors. The United Nations’ recent results on the design and calculation of an Inclusive Wealth Index were also presented above. In 2011 the World Bank initiated “Wealth Accounting and the Valuation of Ecosystem Services” (WAVES), which has a strong focus on developing and emerging economies. WAVES is a global partnership that aims to promote sustainable development by ensuring that the national accounts used to measure and plan for economic growth include the value of natural resources. More concretely, the conventional System of National Accounts as applied by most countries, with its focus on current income flows, should be complemented by wealth accounts valuing material and immaterial wealth as the source for future income. A particular concern is accounting for natural capital, which may be based on the System for Environment-Economic Accounts (SEEA) recently adopted by the UN Statistical Commission, which now is to be implemented in countries.

2.7 Work

2.7.1 Introduction

An alternative growth and development path for Europe must take into account the role of work and employment from an individual as well as from a macroeconomic/societal perspective. Currently one of Europe’s biggest challenges is to combat unemployment in general and youth unemployment in particular. In the medium-term, demographic change, i.e. the imminent ageing of European societies, will require measures to cope with the decrease of labour supply it will

cause.[20] Furthermore, the envisaged socio-ecological transition can be expected to have substantial implications for the different dimensions of work. As Jackson and Victor (2011: p. 101) put it: "Central to a new macro-economics for sustainability lies the relationship between growth, productivity and work… In particular, a low-growth or slow-growth economy must reconcile labour productivity changes with the maintenance of full employment." There is also the question whether the goal to secure rewarding (from a material as well an immaterial perspective) employment and decent working conditions which are securing incomes guaranteeing economic independence for men and women can be reconciled with the goal of environmental sustainability and an alternative growth path based on qualitative rather than on pure quantitative economic growth. Finally, there may be a contradiction between recommendations to expand working time on a weekly basis and in a life-time perspective to guarantee long-term fiscal sustainability of pension systems in ageing societies, environmental sustainability, and individual well-being that might be endangered by increasing work stress and less time for leisure, family and friends (van den Bergh, 2011).

2.7.2 Dimensions of Work

In general, the process of economic development is accompanied by a long-run shift from informal to formal work. At the same time, the number of hours spent in paid work (measured in total yearly working hours per capita) has decreased in favour of leisure in industrialised countries, due to the reduction of weekly working hours, the spread of part-time work mainly in the female labour force and the extension of vacations. Increasing labour productivity and integration of women into the labour market were crucial drivers of this long-term trend which can be observed practically in all developed countries. However, significant differences exist regarding time devoted to paid work and leisure and regarding unemployment rates also between economies on a similar level of development. These have inspired a large body of theoretical and empirical literature on the determinants of the paid/work leisure decision and of unemployment rates.[21]

Another long-term trend is the general increase of life expectancy at age 65 (particularly in the old EU member states with their in general more favourable life and working conditions) as well as years spent in education and therefore the number of "non-active" years in relation to "active" years (Eurostat 2011). Finally, a significant portion of employed persons can be considered as working poor: A survey (Eurofound, 2007) found an average of 8 percent for the in-work poverty rate in the EU27 for 2007. According to data presented by the European Commission (2009) the share of working poor even amounts to 18 percent; with huge cross-country differences.

2.7.3 Specific/Detailed Analysis

The different dimensions of work are of differing importance for the individual sectors of the economy, which are

- market/private sector (for profit)
- household sector/care sector
- third sector (non profit)
- state/public sector
- illegal sector

[20] For current projections of demographic developments and their implications for labour supply, see European Commission (2012) – latest Ageing Report.

[21] See for example Alesina, Glaeser, and Sacerdote (2006), and Rogerson (2008).

These dimensions of work are of differing relevance in the various sectors of the economy. The market (for profit) sector offers formal paid regulated and unregulated work, as well as the third (non profit) sector, where paid work is complemented by voluntary work. The state sector is (or has at least traditionally been) characterised by formal paid regulated work only. Unpaid housework and care work dominate in the household/care sector, complemented by the family provision of care work „paid" by a state subsidy. Paid undeclared work (including care work) belongs to the illegal sector of an economy. These different sectors of the economy and the dimensions of work rooted in them differ in many respects: in particular, with regard to income possibilities, work conditions, career options, social protection and access to welfare provisions, social contacts and not least social status and recognition. It still needs to be explored in more depth how they may contribute to the different sustainability dimensions and a socio-ecological transition.

The major functions of work are to earn one's living, to receive self-esteem and life satisfaction, to use one's skills and to get connected to greater networks and communities. Rewarding employment, decent work conditions, social security and some sort of economic independence are major individual goals related to work.

It is convenient to distinguish between employment and unemployment only. But we have to decompose our allocation of time in many more categories. Most informative is the relative importance of leisure, education, homework, job search (unemployment), informal work (black market, unpaid) and market work. Preferences and institutions play a crucial role for individual time allocation. Facilities of child and old-age care, e.g., are fundamental for female participation rates.

Comparisons between the US and the EU show that the relative importance of leisure and homework is higher in Europe. Americans are more inclined (or forced) to market work. GDP does not include the value of homework (care of children and the elderly, cooking, cleaning, gardening, home-building, repairing etc.). Blanchard (2006) tries to include homework in GDP: According to his calculations, the difference in GDP per head between USA and EU shrinks from 20-25% to about 10%. The remaining difference reflects higher productivity per hour in the United States and a preference for market work vis-à-vis leisure.[22]

The EU aims at reducing gender inequality. There are persistent barriers towards gender equality at work. The ILO (2006) lists various forms of gender discrimination and segregation:

– "Under-representation of women in high-ranked positions (vertical segregation)

– Concentration of women in a narrower spectrum of sectors characterized by lower average levels of earnings (horizontal segregation)

– Concentration of women in smaller establishments with low levels of unionisation

– Over-representation in low-pay, low-status jobs and in atypical forms of employment".

All these forms of discrimination make it more difficult for women to achieve an adequate work life balance. Although the educational attainment of women is usually higher, women earn substantially less than men.

[22] It needs to be further explored whether this "preference" is due to individual choice or to labour market institutions. Americans cannot choose to go five weeks per year on holiday.

2.7.4 Macroeconomic Considerations to Reconcile Growth, Productivity and Employment

High unemployment is currently one the central issues in Europe. The unemployment rate in the Euro area exceeds 12% in 2013, it is much higher than in the US (7½%) and Japan (4½%). In some peripheral Euro countries, one quarter of the labour force and one half of the young people are unemployed. It is undeniable that poor economic performance in the aftermath of the Great Recession boosted the unemployment rate (+4 ½ percentage points). But some countries managed their labour market problems much better than others (Aiginger, et al. 2012, Pissarides 2012, Blanchard, et al. 2013). We may learn from the response to the crisis how labour markets and policies might react to a low-growth period. Ít is interesting to note that unemployment rates are low in rich countries (Japan, Austria, Scandinavian countries) rather than in fast growing countries. Rich countries seem to be able to afford to prevent "open" unemployment in one way or the other: by fiscal policy, labour market training, short-time work, subsidised low-wage jobs, shorter working hours, part-time regulations, shift to education and homework, etc.

2.7.4.1 Economic Growth and Unemployment

Arthur Okun (1962) observed a close empirical relationship between GDP growth and the change in the unemployment rate. This was called "Okun's law" and regarded as one of the most reliable relationships. In recent decades, an Okun coefficient of about 0,5 was estimated in many studies (e.g. Arpaia/Curzi 2010, p.34). This implies that a deceleration of GDP growth by 1 percentage point raises the unemployment rate by half a percentage point year by year (with a certain time-lag).

A recent study by Ball, Leigh, and Loungani (2012) asserts that Okun's Law has been reasonable stable in the United States since 1948. The authors conclude that therefore monetary and fiscal policies would be helpful to reduce unemployment. A study by the European Commission (Arpaia and Curzi, 2010) comes to the conclusion that in Europe the correlation between GDP and unemployment strengthened in the last recession. The liberalisation of EU labour markets has made unemployment more reactive to economic development.

A simple, but wrong argument in public discussions has been that economic growth does not positively affect the labour market because GDP and unemployment are both on a rising long-run trend. Other things being equal, an economic growth rate of about 2% (compensating for productivity gains) will be compatible with a stable unemployment rate (see Marterbauer and Walterskirchen, 2000, Aiginger, et al., 2006). This threshold may vary substantially between countries according to labour supply conditions, productivity performance and labour market policies.

2.7.4.2 How to Escape "Okun's Law"?

A crucial problem of a socio-ecological transition is to reconcile economic growth, labour productivity and employment (Tim Jackson) and to increase the capabilities for flourishing (Amartya Sen). Technological innovations imply that a given output can be produced with less employees year by year. Socio-ecological transition has to take into account the relationship between economic growth and unemployment, and - in the case of low or zero-growth - envisage strategies to tackle unemployment either by raising the employment intensity of growth or by decoupling unemployment from employment. Even if GDP may not be a good indicator to measure welfare, it matters for employment. The effect of green growth on unemployment will probably not differ very much from "economic" growth.

After the Great Recession large deviations from Okun's Law could be found in individual countries: e.g. positive deviations in Germany, negative deviations in Spain (Aiginger, Horvath,

and Mahringer, 2012). Okun's Law may be escaped by many ways, but not the definitional equation that total real income will stagnate in a zero-growth economy. Several ways to achieve a stable labour market with low economic growth will be explored in the following:

- Smaller productivity gains will be an "automatic" result of lower economic growth

- Working time reductions (e.g. short-time work) can raise the employment content of growth and prevent unemployment

- Labour market policies (e.g. retraining programmes) can decouple unemployment from employment

- Labour market flexibility (e.g. low wage jobs) may raise the employment intensity of growth

2.7.4.3 Growth and Productivity

Verdoorn and Kaldor found a close linear relationship between the growth of output and labour productivity (and employment respectively). A fall in output growth by 1% is associated with a decrease in productivity growth by about ½%. This may be explained by lower investment rates and smaller growth rates of the export and manufacturing sector. Moreover, the higher pressure of excess labour supply in low-growth periods will tend to slow down productivity growth, particularly in the non-manufacturing sector.

If we accept this relationship between economic growth and productivity, a slowdown of growth from 2% to zero will "automatically" go along with diminished productivity gains (by about 1% percentage point). There remains a fall in employment by 1% which has to be tackled by labour market and/or working-time policies, i.e. by income-sharing and/or work-sharing.

Kaldor argued that GDP growth is positively related to the growth of the manufacturing sector, i.e. economic growth accelerates when the share of manufacturing in GDP rises. If this is true we may hardly see a renaissance of the manufacturing sector, as it is expected by quite a few economists recently, in a de-growth period.

2.7.4.4 Working Hours

Productivity increases may be "consumed" either by an increase in real wages or by a reduction of working hours. Keynes expected a 15-hours workweek for 2030, but so far productivity gains have been used rather for income and consumption increases than working time reductions. In a world of limited resources, this preference will have to be reconsidered.

In a stagnating economy, the sum of real wages and salaries will be roughly constant (assuming a stable wage share). But labour productivity will still rise by say +1% p.a. due to technical innovations, particularly in the manufacturing sector. Given a productivity-oriented wage policy, real wages would also increase by +1%, and employment would fall by 1%. Such a continuous drop in employment is not acceptable for governments. It may be changed by a reduction in the supply of working hours or by labour market policies. A reduction in working hours may take place via short-time work (in recessions), via a shorter workweek for all employees or for specific groups (e.g. parents with small children), via longer holidays, part-time work regulations for men (e.g. Netherlands), etc. Many labour economists consider the part-time regulations in the Netherlands, agreed upon by social partners, to be a success. The very complicated regulations in France concerning the reduction of the working hours, however, are not regarded best practice.

Within the EU, working hours per week are rather low in the Netherlands, the Scandinavian countries and Germany, whereas they are above average in the South and East of Europe. In the Great Recession (2007-2013) short-time work in Germany and Austria turned out to be

more successful than labour market flexibility in the US and the UK (Aiginger, Horvath, and Mahringer, 2012; Pissarides, 2012).

The future decrease of the working population will alleviate the labour market problems coming along with slow growth. On the other hand, the demographic situation will aggravate the troubles of the pension system.

2.7.4.5 Labour Market Policies

Labour market policies are the most widely used instrument to reconcile low economic growth with almost stable unemployment. They are cheaper than infrastructure programmes or tax cuts, and easier to accomplish than working time reductions. Labour market services can support activities and avoid labour shedding as well as a deterioration of skills. They can provide training programmes to prepare the unemployed for the future and subsidise mini-jobs. The difference between mini-wages and the subsistence level is borne by government. Subsidised jobs and short-term work decrease measured labour productivity (GDP per employee), but without endangering the competitiveness of the export-oriented sector. Labour market policies can help to achieve two goals of social transition: inclusion and solidarity.

In a stagnation period, it is “manageable” to prevent a continuous fall in employment through labour market policies, shorter working hours or low-wage jobs. But there remains the problem of falling real wages in the long run. This makes a redistribution of income politically even more difficult as it implies a real income reduction for some groups which are better off now. The crucial question is: Have we reached such an income level that a further increase in income can be renounced and will be accepted by the electorate? It is Skidelsky’s question: How much is enough?

2.7.4.6 Labour Market Flexibility

Unemployment may also be interpreted as a structural problem: an indicator of an inefficient labour market. Before the Great Crisis, structural unemployment was the key issue. Inflexible labour markets and high welfare costs were regarded by the mainstream as the cause of low growth and high unemployment in Europe. It was argued that European welfare states were unable to restructure from manufacturing to service and financial industries. The relative success of the United States was attributed to deregulated capital and labour markets, in particular to a large low-wage sector. Major theoretical achievements in labour economics during the last decades have been matching, search and bargaining theories (Pissarides 2012). The NAIRU-concept was developed, and labour market flexibility was seen as the panacea against unemployment.[23]

The Beverage curve is an instrument to depict the structural mismatch between labour demand and supply. It represents the relationship between job vacancies and unemployment in a graphical form. A shift in the curve reflects a change in the matching process.

Labour market flexibility is the ability to respond quickly to changes by less employment protection, less regulation of wages and by flexible working hours. The goal is lower structural unemployment and a higher potential output through better adjustment. Flexicurity aims at enhancing flexibility and security.

The functioning of the labour market is important for economic growth since supply will react more quickly to shifts in demand in a flexible market. However, this also holds true for a crisis. After all, boosting investment in future growth by encouraging growth drivers such as research,

[23] From this perspective, it was surprising that low unemployment in Austria went along with a high degree of corporatism (Walterskirchen, 1991, p. 63).

education and technology diffusion appears to be rather more important for growth (Aiginger 2005).

The liberalisation of labour markets went along with the deregulation of capital markets. Both aimed at fostering economic growth. Higher income as a result of economic growth was regarded as an indicator for a better quality of life.

An outstanding phenomenon of the last two decades was the tremendous increase in precarious jobs. This was one of the main negative consequences of the liberalisation of labour markets. Employers rotate new employees to avoid long-term contracts at normal wages. The "working-poor" cannot make up their living from their job, and remain dependent on their families or on government subsidies. They are mostly young people, unable to start a family. This appears to be one of the biggest labour market problems of our time. The goal of rewarding jobs with social security and decent working conditions is not achieved. Policy measures to reduce labour dualism and precarious jobs are urgently needed. Equal and equitable treatment of all workers - including women, foreigners and the young - must be the aim of socio-ecological transition.

2.7.5 EU Perspective

Full employment has been a cornerstone of the European model. With wages and salaries being the revenue base for the social security system, the welfare state depends on a high level of employment and salaries. The long term financial stability of the pension system requires an increase in the employment rate and the effective pension age.

At the level of the EU, paid work is an important issue. The Lisbon Strategy for Growth and Employment set several quantitative employment targets which should be achieved by EU member states by 2010: an overall employment rate of 70 percent, an employment rate for women of over 60 percent, and an employment rate of 50 percent for older workers. The Europe 2020 Growth Strategy, aiming at smart, sustainable and inclusive growth, includes as one of five headline targets an employment rate of 75 percent of the 20- to 64 year-olds by 2020 for the whole EU. This EU level target, which is to contribute to the inclusive growth dimension of the Europe 2020 10-year development strategy, is translated – as are the other headline targets – into national targets in each EU member state, reflecting different country-specific situations and circumstances. The employment rate of the population aged 20 to 64 accordingly is one of the eight indicators proposed by the European Commission to monitor the Europe 2020 Strategy (European Commission, 2010).[24] It should be noted that the EU has employment goals, not unemployment goals, i.e. splitting a full-time job into parts fulfils the EU criterion and saves social security contributions.

The Europe 2020 Growth Strategy inspired the European employment strategy aiming at the creation of more and better jobs in the EU. In April 2012, the European Commission launched a set of measures to boost jobs and thus to counteract the high level of unemployment in Europe. This so-called Employment Package, which builds on Europe 2020's Agenda for New Skills and Jobs, seeks to support job creation, restore the dynamics of labour markets, and strengthen the governance of employment policies.

A crucial element of the EU's Employment Strategy is flexicurity, which can be defined as an integrated strategy for enhancing, at the same time, flexibility of the workforce (from employers' view) and security of workers in the labour market. Flexicurity policies play a key role in modernising labour markets and contributing to the achievement of the 75 percent employment rate target set by the Europe 2020 Strategy. The EU builds their efforts in this realm on a set of

[24] See Pasimeni (2011) for the indicators and a new index to measure and monitor progress of the Europe 2020 Strategy.

common flexicurity principles (European Commission, 2007) that should be implemented by EU member states through four components: flexible and reliable contractual arrangements; comprehensive lifelong learning strategies; effective active labour market policies; and modern social security systems.

3. Conclusions

The paper presented the fundamental concepts as well as the context of the envisaged socio-ecological transition in which the WWWforEurope project is embedded. In doing so, the paper attempted to draw attention to the existence of trade-offs related to goals and implications of a socio-ecological transitions. We also tried to identify crucial problems and questions for which it would be desirable to find answers and solutions in the further work of the individual research areas into which the WWWforEurope project is structured. There are various cross-cutting issues relevant for all research areas of the project. The most important ones are gender issues, equity aspects, new approaches to measure welfare and competitiveness. There are also topics which are not explicitly included in the research done within the WWWforEurope project, in particular fiscal sustainability, the stability of the financial system, or the pension and the health system. In this concluding section, we will address equity/distributional as well as gender aspects as important cross-cutting issues and list important research questions arising in the context of the envisaged socio-ecological transition and in the search for a more sustainable growth and development path for Europe.

3.1 Cross-cutting Issues and Topics not Included in the WWWforEurope Project

3.1.1 Equity/distributional aspects

Practically all the fundamental concepts and terms presented above have equity/distributional aspects, which can only be addressed exemplarily here. In general, sustainability and sustainable development are all about securing generational equity. Equity and the limitation of inequality is a major concern of the social dimension of sustainability. The distributional impact of environmental sustainability and of policy instruments (e.g. environmental taxation) aiming to strengthen may be more ambiguous. It depends on the distribution of the benefits of increasing environmental sustainability (which often favour lower income groups over-proportionately as they have less options to escape negative environmental externalities) compared to the distribution of the burden resulting from the application of instruments of environmental policy, e.g. environmental taxation, which are often expected to burden lower incomes more than higher incomes (Kosonen, 2012).

There are also – often debated – relations between growth and distribution. On the one hand, empirical evidence is mounting that – contrary to the conviction dominating in economics – (increasing) inequality is no stimulus for growth but may rather endanger it, at least above a certain extent (e.g. Baumol, 2007). On the other hand, the general expectation in economics is that economic growth more or less automatically has a positive impact on income distribution. While in principle economic growth does of course increase the scope for governments for redistribution – given the political will –, the fact that in the last decades economic growth went along with increasing inequality[25] in many OECD countries, for example, calls into question this quasi-automatism. While growth in general reduces income differences in the long run, this is

[25] See OECD (2011) and the various recent studies by the OECD under the heading “Less Income Equality and Growth – Are they Compatible”, published in 2012.

not true under all circumstances and in all sub-periods. In the past years of globalisation and technical progress (favouring highly-qualified labor), income disparities within countries increased, whereas income differences between countries often decreased. What growth does in almost all cases is to decrease absolute poverty.

Finally, the relation between equality and societal and individual welfare/well-being has been discussed quite intensely in the last few years. Richard Wilkinson and Kate Pickett in their book "The Spirit Level" (2009) focus on the negative impact of income inequality on health and well-being of societies. It is also increasingly claimed – based on growing empirical evidence – that more equal societies are happier.
Another issue is wealth and equity. First of all, wealth – in a conventional definition including material assets only – is distributed very unevenly among individuals/households (Bonesmo Fredriksen 2012; ECB 2013), but also on a global scale. Wealth inequality is much larger than earnings, income and human capital inequality (Davies, 2011). Wealth plays an important role in the intergenerational transmission of inequality (Davies, 2011), and growing wealth inequality implies decreasing starting opportunities. Wealth according to a comprehensive/inclusive definition is also closely related to intergenerational equity. As Davies (2011) points out, wealth is an important determinant of individual well-being. It is crucially dependent on welfare state provisions (for example, pension insurance, education system, etc.) to what extent wealth inequality translates into an unequal distribution of well-being. In any case, alternative measures for welfare/well-being need to take into account inequality (Stiglitz, Sen, and Fitoussi, 2009).

3.1.2 Gender Aspects

There are also manifold gender aspects – often interrelated with equity aspects – to be considered in the discussion of the fundamental concepts and terms this paper is dealing with. These can only be mentioned here very briefly, as an illustration, but not treated in detail.

For example, as women are represented over-proportionately in the lower income groups, it is often expected that they bear a disproportionate burden of policy measures aiming at environmental sustainability, for example environmental taxation. The social dimension of sustainability is concerned with gender equality. The existing gender differences in the division of (formal and informal) work directly result in gender differences regarding income, social security and finally also wealth. Welfare state provisions mitigating an uneven distribution of income and wealth often are of different importance for men and women.

Concerning gender and innovation, the mainstream innovation literature largely lacks gender considerations. Nevertheless, the number of empirical studies on gender innovation is growing. The main finding of this literature is statistical evidence of a positive relationship between the likelihood of innovation (by a firm) and gender diversity (see for example Østergaard, Timmermans, and Kristinsson, 2011). An example for this approach can be found in the field of medicine: the creation of new medicines, which are invented through analysis of specific gender differences.

Alternative measures of welfare/well-being also need to integrate gender aspects. Some existing measures already focus on gender inequalities in an overall assessment of well-being. The United Nations Development Programme (UNDP) has developed two indicators, based on Amartaya Sen's capabilities approach. In 1995 the UNDP introduced the Gender-Related Development Index (GDI) and the Gender Empowerment measure (GEM) to capture the gender-sensitive dimensions of human development. The GDI was introduced in order to complement the information contained in the Human Development Index (HDI) by identifying gender gaps in life expectancy, education, and incomes. The GDI is based on "inequality" penalty scores for gender gaps in any of the categories of the HDI (Klasen, 2006). One disadvantage of the GDI is that it can only be used together with the HDI score and, thus, it cannot be employed as a separate indicator of gender inequality. Some propose an alternative to the Gender-related Development Index, which would require the separate calculation of HDI

for men and women (Klasen and Schuler, 2011). Another suggestion considers the Gender Gap Measure, which would serve as a direct measure of gender inequality. The second gender sensitive measure of development employed by the UNDP focuses on the empowerment of women. The GEM is particularly concerned with assessing women's empowerment relative to men. GEM consists of three components: political representation, representation in senior positions in the economy and power over economic resources (proxied by earned incomes). Similarly to GDI, it uses the same aversion-to-inequality procedures that penalises inequalities in political and economic representation as well as earned incomes (Klasen and Schuler, 2011). In addition, indicators for the quantity and quality of work and employment are central to identify gender gaps.

Attempts to measure subjective well-being and to interpret the results also need to account for gender differences, as several recent studies show that reported subjective well-being and life satisfaction differ between men and women (OECD, 2013, and the studies cited therein).

Choices between the different kinds and dimensions of work, which are influenced by individual preferences and institutions, are often different between men and women accordingly. There are considerable gender differences in the distribution of formal versus informal work and of work in the different sectors of the economy (market, state, household, third sector, illegal sector). Paid work generates access to wages, social security, power, economic independence, and a sense of significance. An important step in reaching gender equality is increasing the female participation rate. However, the dominant point of view is yet rather one-dimensional and therefore criticised with a reference to the gendered division of paid and unpaid word: If unpaid work is not ‚valued', the integration of women into the labour market may not further gender equality because women are forced into part-time, flexible or marginal jobs. Paid work is an important issue at the level of the EU. One Lisbon target of 2000 was to increase the female employment rate to 60% by 2010. European social policy has been rather transformative in focus, yet the emphasis on paid work runs the risk of a rather instrument vision of gender inequality, with a tendency for policies not to be grounded in a discourse about gender and equality but rather in an analysis of economic efficiency: the potential for growth and the sustainability of pensions and benefits necessitate a higher employment rate for women.

3.2 Important Research Questions arising in the Context of a Socio-Ecological Transition

Finally, we present a pure collection of important research questions arising in the context of a socio-ecological transition. Being well aware that it won't be possible to answer all these questions within the WWWforEurope project, finding answers and solutions to these questions is crucial for the design and implementation of a new growth and development path for Europe.

- Which implications does a transition to a more sustainable path of growth and development have for public finances, and how can sufficient revenues be secured to finance government expenditures (in particular social security and pension systems) and to maintain fiscal sustainability in the long-run?

- In which relation should sustainability in the traditional sense (environmental, social and economic sustainability) and fiscal sustainability stand?

- How does growth (negatively and positively) impact on generational equity beyond the negative effects of environmental damage?

- Which policies (desirable or non-desirable) do those countries apply which have been living rather successfully with low growth for quite a long time (e.g. Japan)?

- How can social mobility be achieved and maintained under the condition of low growth?

- Can Europe embark on a new growth and development path isolatedly, without considering the necessities of globalisation and the need to maintain international/world-wide competitiveness?

- What are the problems if transition is envisaged in some regions, but not in others (for international investment, for migration, etc.)?

- Which role does/can/should labour productivity play in a socio-ecological transition?

- How can individual preferences be shifted towards less growth, i.e. less work and consumption and more leisure?

- Is it possible – and if yes, how – to bind politicians and voters to a more long-term oriented, less myopic policy?

- Are periods of low growth usually/necessarily – in a historical perspective – periods of increasing income inequality, lower innovations and less intense sustainability efforts?

- Are there any examples for periods/countries in which economic stagnation was/is connected with low/decreasing unemployment? Are there examples for periods/countries in which economic growth was/is connected with absolutely declining material and energy inputs (decoupling)?

- Why have some periods of growth been connected with low employment and rising income differences?

- How can the chances of young people and of outsiders in general be enhanced and advantages/privileges of insiders be limited?

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Project Information

Welfare, Wealth and Work for Europe

A European research consortium is working on the analytical foundations for a socio-ecological transition

Abstract

Europe needs change. The financial crisis has exposed long-neglected deficiencies in the present growth path, most visibly in the areas of unemployment and public debt. At the same time, Europe has to cope with new challenges, ranging from globalisation and demographic shifts to new technologies and ecological challenges. Under the title of Welfare, Wealth and Work for Europe – WWWforEurope – a European research consortium is laying the analytical foundation for a new development strategy that will enable a socio-ecological transition to high levels of employment, social inclusion, gender equity and environmental sustainability. The four-year research project within the 7th Framework Programme funded by the European Commission was launched in April 2012. The consortium brings together researchers from 33 scientific institutions in 12 European countries and is coordinated by the Austrian Institute of Economic Research (WIFO). The project coordinator is Karl Aiginger, director of WIFO.

For details on WWWforEurope see: www.foreurope.eu

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