

1. Introduction

Sustainable development (SD) has been on the global agenda for almost three decades: it was first identified in the Brundtland Report (Brundtland Commission, 1987) and further highlighted by Agenda 21 (UN, 1992). Since then, global society has achieved some significant successes, such as the reduction in ozone-depleting chemicals and the increased use of renewable energy sources, as well as in decoupling emissions and economic development (UNEP, 2011), becoming more efficient in terms of production, consumption and re-use of resources and materials. As resources and material consumption grows, there is a decline in emissions, energy and material use per output (Krausmann et al, 2009). Technological improvements and development have reduced the energy and material intensity while increasing per capita wealth (Sorrell, 2015). Further positive steps have been taken in the area of access to fresh water, where nearly 90 % of the world's population in developing countries now has access to improved sources of drinking water (UNEP, 2011). However, sustainability-related challenges still exist and have been identified by Hutt (2016) at the World Economic Forum, emphasizing also resource security, a topic on which this Special Volume (SV) section provides information on current research of both a theoretical and practical nature.

This SV section on sustainable consumption and production (SCP) identifies challenges and provides solutions related to resource efficiency (ReE), sustainable water systems, sustainable management, cleaner production (CP), and sustainable urban development. Sustainable solutions are seen as key for changing production and consumption patterns, where experts in the areas of business development, design for sustainability, consumer behavior and system innovation come together to play a role in shaping such solutions, since many sustainability problems seem to be unsolvable by actors in the production-consumption value chain (Tukker et al, 2008). Lorek and Fuchs (2013) distinguished between “strong” and “weak” SC, where the “weak” approach assumes that SC can be achieved by improvements in RE, as a consequence of technological solutions and innovations. SC is based on the assumption that changes in consumption patterns are necessary to achieve SC, where the need for reduction of overall resource consumption rather than of the product based individual consumption is emphasized (Lorek and Fuchs, 2013).

Achieving “strong” SC, which provides a framework for exploration of linkages between consumption, SD and de-growth, and emphasizes social innovations and technological pessimism (Lorek and Fuchs, 2013), could lead to solutions to the above mentioned challenges, and a transformation of global society towards SD (Waas et al, 2012).

Such a transformation requires political, economic, institutional, behavioural and technological shifts, which are realized not only through SC, but also through Sustainable Production (SP) principles, approaches and strategies that will require increased efforts towards their implementation in future decades. Therefore, radical changes are needed regarding CP, zero waste approaches, increased ReE, and the circular economy (CE) paradigm.

Global policy recommendations and international agreements regarding sustainable development, such as Sustainable Development Goals (SDGs) led by United Nations (UN) and its organizations (e.g. UN Environment Programme (UNEP) or UN Development Programme (UNDP)) are shaping our common future (Unteregger, 2015); however, the inability to accept a common “sustainable policy” shows individualism of people, corporations, nations and countries, and not a collectivism towards our common responsibility for the future generations. Individualistic behaviours with their search for profit maximization and wealth accumulation (see OXFAM International, 2015) are identified as having created economic, environmental and social imbalances. Calls and efforts towards SD seek to establish a dynamic equilibrium among these elements, where collaboration represents one of the key factors in the transition towards more sustainable societies (Lozano, 2007). Global action

and international laws can diminish the negative effects of climate change, resource depletion, and biodiversity reduction. Control of population, use of renewable energy sources, and SCP can slow down the pollution and resource depletion, reduce the increasing non-equilibrium, and a possible uncontrolled, stochastic development (Glavič, 2010).

This SV section was developed mainly from papers presented at the 17th European Roundtable on Sustainable Consumption and Production (ERSCP), held in Portorož, Slovenia, 14–16 October 2014, which had as its title “The Europe We Want” and at which SCP was the over-reaching theme. The SV section brings to the forefront SCP solutions to the global challenge related to resource security. It presents new knowledge and contributes to the SCP discussion through articles covering both the theoretical and practical perspectives, across a range of topics, also emphasized at the conference. These topics include: solutions of SCP, and ReE in companies through environmental management, resources efficiency related to water systems, ReE and CP in textile industry and a brewery, and sustainable urban development cases.

2. Sustainable Consumption and Production update

Two achievements from Autumn 2015 have to be mentioned – the Paris Agreement and the adoption of the United Nations (UN) Sustainable Development Goals (SDGs). They are connected to UN Development Programme’s (UNDP) Strategic Plan focus areas: SD, democratic governance and peace building, and climate disaster resilience.

The Agreement dealing with GHG emissions mitigation, adaptation and finance, starting in the year 2020, has been accepted within the United Nations Framework Convention on Climate Change (UNFCCC) at its 21st Conference of the Parties (COP 21). It sets out a global action plan for the world to avoid dangerous climate change by limiting global warming to below 2 °C. At the Paris climate conference in December 2015, 195 countries adopted the first-ever universal, legally binding global climate deal (European Commission, 2015).

SDGs contain 17 goals with 169 targets covering a broad range of SD issues. SD Goal No. 12 aims to ensure SCP patterns – it is about promoting resource and energy efficiency, sustainable infrastructure, and providing access to basic services, green and decent jobs, and a better quality of life for all. SCP aims at “doing more and better with less”, increasing net welfare gains from economic activities by reducing resource use, degradation and pollution along the whole lifecycle, while increasing quality of life by involving various stakeholders (e.g. businesses, consumers, policy makers, researchers, scientists) (UN, 2015). SD Goal 12 places the most emphasis on water and energy (UN, 2015), topics covered directly or indirectly by this SV section. Only 0.5 % of World’s *water* is fresh (drinking water); more than 780 million people still do not have access to it. Humans are polluting water faster than nature can recycle and purify it in rivers and lakes. Excessive water use contributes to the global water stress. Despite the *energy* efficiency gains, energy use in OECD (Organization for Economic Co-operation and Development) countries will continue to grow another 35 % in 2015–2020. Commercial and residential energy use is the second most rapidly growing area of global energy use after transport. Households consume 29 % of global energy and consequently contribute to 21 % of resultant CO₂ emissions.

Out of the UN’s 17 SDGs, four are specifically considered in the articles appearing in this SV section: (6) Water – ensuring availability and sustainable management of water and sanitation for all; (7) Energy – ensuring access to affordable, reliable, sustainable and clean energy for all; (12) Consumption – ensuring SCP patterns; and (17) Sustainability – strengthening the means of implementation, and revitalizing the global partnership for SD.

The United Nations Environment Programme (UNEP, 2012) strives to promote SCP and ReE in both developed and developing countries. The focus is on achieving increased understanding and implementation by public and private decision makers of policies and actions for SCP and ReE. This includes the promotion of sustainable resource management in a life cycle perspective for goods and services. International scientific assessments such as the Millennium Ecosystem Assessment, the Global Environmental Outlook, and the 4th Assessment Report of the Intergovernmental Panel on Climate Change (IPCC), make it increasingly evident that the world cannot achieve sustainable economic growth without significant innovation in both the supply (production) and demand (consumption) sides of the market. UNEP's ReE Programme focuses on four central themes: 1) strengthening and communicating the knowledge base for SCP and ReE; 2) building governmental capacity; 3) consolidating and extending partnerships with business and industry; and 4) influencing consumer choice. UNEP is working with a range of partners to ensure that: a) ReE is increased and pollution is reduced over product life cycles and along supply chains; b) Investment in efficient, clean and safe industrial production methods is increased through public policies and private sector action; and c) Consumer choice favours resource efficient and environmentally friendly products.

The European Union (EU) recognized the great challenge faced by economies to integrate environmental sustainability with economic growth and welfare by decoupling environmental degradation from economic growth, and doing more with less (EU, 2008). This is one of the key objectives of the EU, but the consequences of climate change and the growing demand for energy and other resources are challenging this objective. An Action Plan on SCP and Sustainable Industrial Policy was adopted by EU to maximise business potential by transforming environmental challenges into economic opportunities and providing a better deal for consumers. In addition, the European Commission adopted an ambitious CE Package, which included revised legislative proposals on waste to stimulate Europe's transition towards a CE boosting global competitiveness, fostering sustainable economic growth and generating new jobs.

3. Terminology and European perspectives of Smart Specialization integration

This section briefly reviews the development of terminology in the field of SCP and ReE, and how the terminology can be used to foster better communication by integrating a European perspective on Smart Specialization (SmS), including a theoretical framework for achieving SCP. It is aimed at supporting an easier understanding of sustainability knowledge within the SCP community. The classification has been used, together with a brief review of the literature, to provide an in-depth picture of the topics as well as to define the trends within the SCP that can contribute towards SD at a global level (Glavič and Lukman, 2007).

As sustainability research continues to develop, new definitions of existing terms were also emerging. New terms such as SCP, ReE, smart cities (SmC), education for SD (ESD), SmS, and CE were identified. These terms are now also in common use in scientific publications, policy recommendation and directives as well as other field oriented expert papers, e.g. publications from the Ellen MacArthur Foundation about the CE (Ellen MacArthur Foundation, 2016). The terms have been integrated into the hierarchical classification of sustainability-oriented terms (see ellipses in Fig.1), which identifies relationships between those terms, using a system's approach, based on several elements: principles, approaches (tactics), sub-systems (strategies) and sustainable system. These six terms and their definitions are clarified and explained, and Fig.1 shows their hierarchical position.

Insert Fig. 1