Looking to the future:

Trend report for a forward-looking resource policy

Für Mensch & Umwelt

Umwelt Bundesamt

Imprint

Published by:
Umweltbundesamt
Fachgebiet I 1.1
Postfach 14 06
06813 Dessau-Roßlau
Fax: (0340) 2103-0
E-mail: info@umweltbundesamt.de
Internet: www.umweltbundesamt.de

facebook.com/umweltbundesamt.de
www.twitter.com/umweltbundesamt

Authors:
Susanne Langsdorf and Martin Hirschnitz-Garbers
(Ecologic Institute)

With contributions from:
Doris Bergmann and Jonathan Buhl
(European School of Governance)
Sabrina Heinecke and Robert Ostwald
(Ecologic Institute)

Editorial:
Ullrich Lorenz

Ordering brochures:
Umweltbundesamt
c/o GVP
Postfach 30 03 61, 53183 Bonn
Tel.: (0340) 2103-6688
Fax: (0340) 2104-6688
E-mail: uba@broschuerenversand.de
Internet: www.umweltbundesamt.de

Download: http://www.uba.de/publikationen/zukunftsszenarien-nachhaltigkeit

Project: www.simress.de

Photo credits:
Cover: © Argus_Danerous_World/fotolia.de; p. 7: © trueffelpix; p. 9: © fototrav/iStockphoto.com; p. 10: ©samxmeg2/iStockphoto.com; p. 12: © TommL/iStockphoto.com; p. 14: © mdfile/Fotolia.com; p. 16: © anyaberkut/Fotolia.com; p. 18: © fatihhoca/iStocphoto.com; p. 20: © A_Bruno/Fotolia.com; p. 21: © Darryl Sleath/Fotolia.com; p. 24: flashpics/Fotolia.com; p. 25: 13freetimes/Fotolia.com; p. 27: © Lorraine Boogich/iStockphoto.com; p. 29: © Blend Images/iStockphoto.com; p. 32: © anouchka/iStockphoto.com; p. 33: © YinYang/iStockphoto.com; p. 35: © AtomStudios/iStockphoto.com; p. 37: © samxmeg/iStockphoto.com; p. 39: © chungking/Fotolia.com; p. 42: © PetairFotolia/Fotolia.com; p. 45: © Dangubic/iStockphoto.com; p. 46: © Harvepino/iStockphoto.com; p. 48: © shironosov/iStockphoto.com; p. 50: © atakan/iStockphoto.com; p. 52: © Carlo Süßmilch/Fotolia.com; p. 54: © Yuri Arcurs/Fotolia.com

Date: September 2014

Content

Foreword

Dear reader,

The world is in a process of change and development. Not only is technology advancing, but the environment as well as political, social and economic systems are constantly changing. To respond, it is important to look ahead so as to recognise and take advantage of opportunities as well as detect and minimize risks to mitigate negative consequences.
In this context, the use of natural resources plays a key role: people use natural resources such as energy, land, water or various raw materials to an ever greater extent. This use is not without consequence: the climate is changing, pollutants accumulate in the environment, raw material extraction is becoming more and more complex, and biological diversity is threatened. Due to the impact of human activities, some argue that our current era should be called the "Anthropocene" – the age of man. Although many global processes and developments are caused by human activity, some become independent and accelerate once they have been ignited by human activity. Climate change is one of the most pressing manifestations of this: global warming – caused by the anthropogenic greenhouse effect – is increasing, leading to an accumulation of extreme weather events, a rise in sea level and further desertification. We have long since recognised these so-called global megatrends, which also include demographic change, urbanisation and global marketisation. In addition to these, other trends are now just emerging that are likely to influence future developments in as yet unknown ways.

A forward looking and precautionary resource and environmental policy has to take into account not only megatrends but also emergent developments. We must detect and observe emerging trends critically in order to be able to design appropriate responses. Sustainable resource policy must consider that in the future an increasing number of people will rely on natural resources, while simultaneously ease of access will decline: for example, agricultural land will degrade further, more forests will be converted into monocultures, raw materials will be locked in buildings and infrastructure, and natural deposits will become increasingly difficult and expensive to develop.

Thus, sustainable resource policy means more than simply mitigating negative environmental effects. It involves working proactively and taking precautions to ensure that the economy does not run out of raw

materials, that resources are extracted in an environmentally friendly and socially responsible manner, and that the material dependence of economic activity is reduced. Sustainable resource policy must consider global responsibility and shape the distribution of resources equitably. All imported raw materials should be obtained in compliance with minimum environmental and social standards.

Achieving these goals in a changing environment is a key challenge for sustainable and modern resource policy. In order to navigate and plan ahead, it is useful to scan the horizon for relevant developments. Detecting threats and opportunities early extends the time for adequate reactions and prudent adaptations. From the horizon scanning we can expect many relevant developments for resource policy in the socio-economic and socio-cultural arenas. This is good news, as trends in those systems are influenced – and thus possibly controlled – by humans. Therefore, the act of scanning the horizon for new trends is not so much about megatrends such as demographic developments and climate change, but on emerging issues such as changes in the working world, macroeconomic and financial systems, or human dietary choices – all of which offer starting points for resource policy transformation.

We cannot and do not want to predict the future, but we can adjust to developments as early as possible. This report was prepared as part of the project "Models, potentials and long-term scenarios for resource efficiency" (SimRess). It presents developments and trends that may have an impact on the design of sustainable resource efficiency policy. These trends should raise awareness for future developments. They show potential opportunities, but also risks for the development of policy. This report is intended to illustrate what is coming our way and enrich the further development of the German and European resource policy with new perspectives.

I wish you an enjoyable and interesting read

Harry Lehmann
Head of Department I

1 Why should you read this trend analysis? How was it created?

In the future, will we live in the city or the countryside? Will we rely on traditional models of growth and consumption or will we develop alternative, more sustainable lifestyles? Will we work longer, more and increasingly faster, or will we strive for more free time and quality of life? Does digitisation rob us of our privacy, or does it allow consumers more transparency and influence? How can German resource policy respond to these possible developments?

This report looks at trends that a forward-thinking national resource policy should consider. The focus is on (German) national trends, but global trends are discussed wherever relevant to national concerns.

These trends will determine how we live and work in the future. Their further development, however, is uncertain. This analysis can help outline possible future paths of various sectors of society and, thus, better shape a forward-looking resource policy.

This report summarises trends into 12 major themes. Often a theme has a dominant arc of development, however there are always countertrends as well. Which development eventually prevails depends on a variety of societal, economic and political factors and decisions. The trend analysis supports recognising the opportunities, risks and niche developments early on and, by doing so, can help develop a course of action.

The report also considers trends' interactions with each other: they involve complex causal relationships and connections that mutually influence, drive or counteract one another. Possible connections and interactions between trends and trend themes are explored comprehensively in a separate section.

This report seeks to raise awareness of and anticipate potential relevant developments, while taking interactions between them into account. Readers can thus use the findings in their respective field, tackling emerging opportunities and risks early on. Forward-looking resource policy can profit from this, as it supports longer term action and can make reveal useful new alliances among actors.

How was this trend analysis undertaken?

A segment of the field of "future studies," trend analysis analyses "possible, desirable, and likely future developments and design options as well as their requirements." This analysis thus takes into consideration social, economic and technical developments. First, the research team examined individual trends in newspaper and Internet research, summarising them into themes. The trend themes were confirmed, supplemented and concretised in an expert workshop and via expert interviews. Finally, researchers investigated each trend theme for its connection to other individual trends and trend themes, assessing its resource and environmental relevance as well as identifying possible entry points for policy.

The 12 trend themes condense over 300 identified individual trends. Global and national megatrends such as demographic change, climate change or Germany's energy transition ("Energiewende") were deliberately excluded from the analysis, because these themes have been researched intensively. The research also excludes a separate theme on energy in general, as the many trends within that issue are beyond the scope of this analysis. Instead, relevant energy-related trends were included in several places in other trend themes. Where relevant, the impacts of the excluded megatrends are considered in the themes, however: for example, the transformation of the German labour market cannot be understood without examining demographic change. Finally, the analysis does not endeavour to be comprehensive with respect to the trends contained in each theme. Rather, the selection focused both on dominant trends and on possible emerging niche trends.

1 | Kreibich, Rolf, 1995. Zukunftsforschung. In: Tietz, Bruno (et al.), Handwörterbuch des Marketing, Stuttgart.

2 Who is this trend analysis for and how is it best read?

This report is geared towards experts in the fields of resource and sustainability policy. Given the variety of themes, however, it is also interesting for professionals in other fields and the general public. Depending on the interests and expertise of the reader, it is possible to select certain trend themes and then move on to other trends and trend themes to which they are linked. Links in the electronic version as well as references in the print version make it easier to jump between different themes.

The trend theme descriptions are structured as follows:

» Each trend theme begins with a **short introduction** of the particular theme in which the most important developments are summarised. The first page also shows:
  › A **radar chart** with a qualitative scale from 1 = low to 5 = high to provide an initial assessment, according to the authors of the respective section, of resource and environmental relevance, political manageability as well as the number of links to other themes. In addition, the chart shows whether the trends in the trend theme are more likely to drive other individual trends and trend themes, or whether they will be driven themselves.
  › The "**status quo**" of the trends in each theme – supported by figures where possible.
  › A description of the **resource and environmental relevance** of the theme's trends.
» Under the heading "In motion: **trends and developments**" trends are examined more closely.
» The trend theme description then lists possible **entry points for resource policy** which can either strengthen the respective trends or counteract them.
» In conclusion, the figure **Links to other trend themes** lists some of the interactions of individual trends with other trend themes. The list reveals interactions with and causal chains to other trend themes. These are highlighted throughout the descriptions (also see "trend theme x").

Chapter 4 is devoted to an in-depth analysis of trend interaction: 30 highly individual driving trends are combined into three thematic clusters and their causal relationships and positive feedback loops are visualised and explained.

Terms

Trends/individual trends
A trend describes developments that have been observed for some time which indicate more long-term, non-cyclical – but often statistically recordable – general movements of change.[2]

Trend themes
Trend themes summarise relevant trends for specific fields of action or sectors and take into account existing causal relationships.

Megatrends
Megatrends are long-term transformation processes that fundamentally affect social, economic, political and technological areas and can be observed over decades.[3]

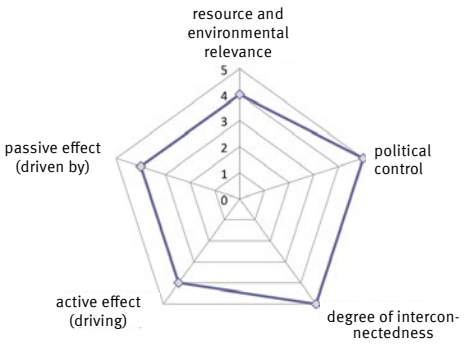
2 | Horx, M., 2014. URL http://www.horx.com/Zukunftsforschung/2-02.aspx, visited on 14. August 2014.
3 | Z_Punkt, 2014. URL http://www.z-punkt.de/megatrendanalyse.html, visited on 14. August 2014.

3 Summary of trend themes

Trend theme 1

Urbanisation

Global population is increasingly concentrated in cities. On one hand, this has led to the spread of urban consumption and behaviour patterns combined with an increase in resource requirements. On the other hand, higher population density offers significant potential for resource and energy efficiency.



Status quo

Today, over half of mankind lives in cities. However, there are major differences in the degree of urban population globally: in Europe over 70% of the population lives in urban areas, whereas the figure is 45% for Asia and 40% for Africa [1]. Urbanisation – defined as an increasing percentage of population living in an urban environment – is usually the result of rural residents migrating to the city [2].[4,5] Cities have always been traffic hubs as well as centres for business, culture and innovation. Key cultural and economic developments emerge in urban centres [3]. Cities host a highly diversified and organised labour force, which contributes to cities' economic success [4]. Cities cover only around 6% of the Earth's land mass [5] but generate over 80% of global GDP [6].

The high population density in cities leads to high material flows: on one hand, the population in cities must be supplied with material – on the other hand, this population creates waste that must be disposed of outside the urban space. At the same time, density increases the potential for conflict: epidemics and catastrophes pose a greater threat.

In Germany, 77% of all people live in cities[6] or semi-urban areas.[7] In recent history, a counter development emerged: between 2005 and 2007, semi-urban and even rural areas recorded a slight growth whereas urban areas experienced a slight decrease in population [7]. During the last 60 years, the land area required for residential and transport purposes has more than doubled. In 2012, 74 hectares per day were re-zoned for these purposes, mostly at the expense of agriculture and arable land.

4 | Other definitions focus on the growth of cities without the influx from rural area or the spatial expansion of cities.
5 | "Urban" is defined differently in various countries and organisations, which has a significant effect on the data. Economic approaches are often aimed at the employed population (agriculture vs. production and service sector), geographic approaches at the density. New administrative divisions have an effect on national statistics as well as the percentage between city dwellers and rural residents [16].
6 | Definition according to the Federal Statistical Office: "Urban (or densely populated) areas are primarily communities which have a population density of more than 500 inhabitants per km² and individually – or or as an area connected to neighbouring communities with the same density category – have at least 50,000 inhabitants." [7]
7 | Definition according to the Federal Statistical Office: "Semi-urban (or intermediate density) areas are communities which each have a population density of 100 to 500 inhabitants km² and those – again in connection to neighbouring communities with the same density category – which reach a population number of at least 50,000 inhabitants." [7]

Resource and environmental relevance of the trend theme

Globally, increasingly urban consumption and behaviour patterns contribute to a rapid rise in overall resource consumption and negative environmental impacts. Today, cities already cause roughly 70% of energy-related carbon emissions and consume 60–80% of fossil and renewable energies [14,15].

However, cities are significant because of the policy options they offer. Cities have a very high "life expectancy" – as opposed to companies or countries, cities often exist for centuries or millennia. City governments are in touch with local challenges, are in close contact to citizens, and deal with many of the key factors for a resource-efficient economy, such as urban planning, construction, or waste/recycling, which are decided locally [14]. In addition, city dwellers often benefit directly from resource efficiency measures: environmentally friendly transport planning also means less air and noise pollution [14, 15]; energy-focused building refurbishment leads to lower household energy costs.

This longevity is not only the case for the city as a level of governance, but also for infrastructure: resources are tied to urban infrastructures, sometimes over many centuries. Urban mining measures can be used to reclaim resources from the anthropogenic deposits of the city.

In motion: trends and developments

Urbanisation and social welfare enhancement

The urban population continues to greatly increase across the globe; megacities are growing and new ones are emerging.[8] In the next two decades, over 130 new big cities will join the list of the 600 economically strongest urban centres; these are exclusively composed of cities in emerging and developing countries [6]. The standard of living is mostly above the national average in cities. Resource-intensive urban consumption and behaviour patterns are spreading, particularly in the middle class of emerging economies [2, 17]. As a result, the need for resources is increasing globally.

Use of efficiency potential

Cities are increasingly taking advantage of efficiencies resulting from density, compactness and innovation. The diversified use of space has reduced transport and energy requirements, sustainable transport models are emerging, and the shift from industry to a service economy has reduced resource consumption and pollution. Environmentally conscious city governments increasingly network with other cities to foster resource conservation and efficiency via new alliances such as the Covenant of Mayors. Pioneering cities show the potential for improvements in resource conservation and resource efficiency: Copenhagen aims to be carbon neutral by 2025 [8]. Residents of cities in rich countries have per capita emissions lower than the national average, however suburban areas are often particularly inefficient [9, 10]. In the developing world, the opposite tends to be the case: the CO_2 footprint of cities is usually well above the national average, with higher standards of living reflected in higher per capita consumption and emissions. Research is as yet lacking on whether this connection is true for resource use in general. It is plausible that the smaller living spaces and lower personal vehicle ownership typical of cities has a positive impact on the consumption of resources per capita.

In addition to state-run redesign policies, citizens' initiatives, which support and implement the transformation towards more sustainability, are flourishing. Cities are increasingly functioning as laboratories for new life models.

On the flipside, urban centres require substantial land area and resources to sustain their high material flow rate, or levels of input and output. The process of urban sprawl counteracts the efficiency potential of urban centres, in particular as regards land use.

Cities and climate change

Cities contribute to climate change because of their high material flows and energy consumption – at the same time, high population density and dependence on infrastructure makes them particularly vulnerable

8 | In some megacities, like São Paulo, Mexico City and Calcutta a countermovement has been seen in the last few years.

to the effects of climate change. At least one third of the 633 biggest cities of the world are located in areas at risk of flooding. Today, flooding already poses one of the greatest threats for cities, and it will further escalate due to climate change-induced sea level rise. Around 663 million people live in these most at-risk cities [11]. Other climate change phenomena, such as heat waves, drought and the subsequent water scarcity, will increasingly strike non-coastal cities. Wealthier cities will invest heavily in adaptation measures and thereby partially reduce their vulnerability. Poor cities, however, will become increasingly vulnerable to climate change effects exacerbated by insufficient infrastructure, lack of disaster prevention resources or health and emergency facilities. Low-income populations in emerging economies and developing nations are most at risk. 95% of all casualties from natural disasters between 1970 and 2008 occurred among those subgroups [12]. Increasing social inequality will further intensify the potential danger for the poorest segments of society. In addition, alienation from nature is increasing, particularly in megacities, but also in smaller urban centres. This can have a negative impact on the acceptance of environmental policy measures as well as measures requiring public participation.

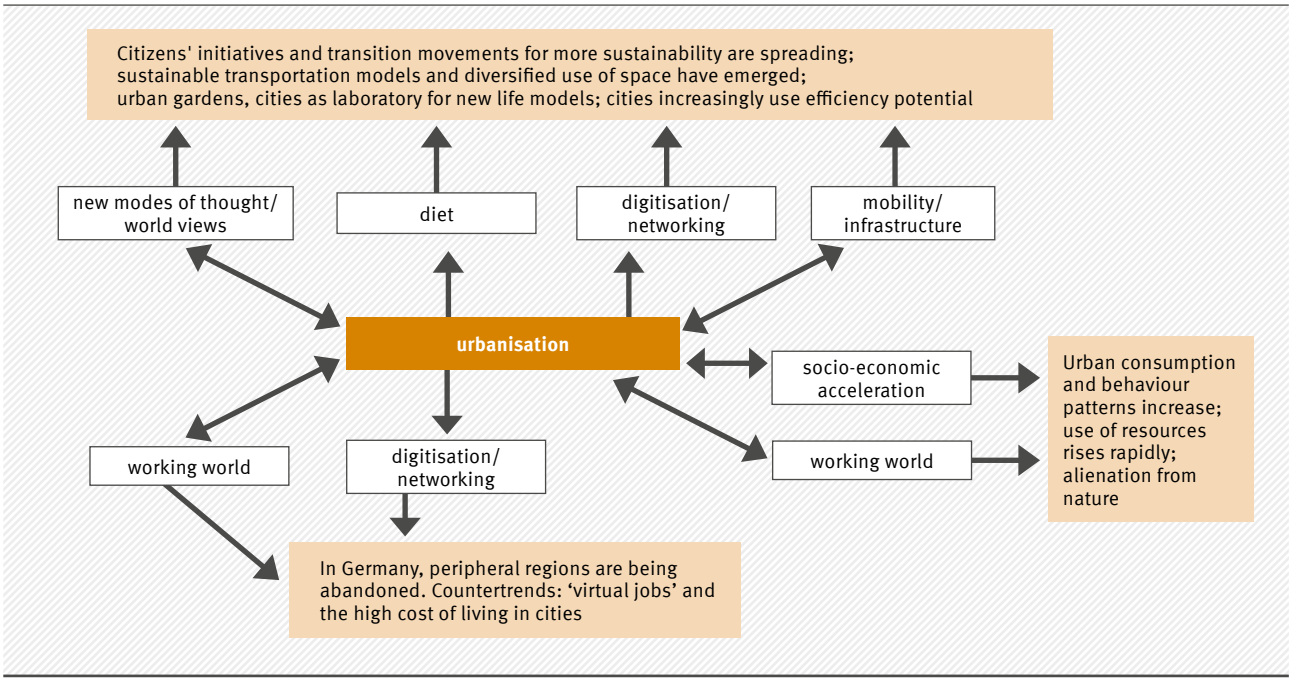
Germany – growing urban centres, shrinking periphery

In Germany, the population in rural areas is shrinking. According to the Federal Statistics Office, the German population will decline by 12 million by 2050. Rural areas are disproportionately affected, with ageing and emigration being primary drivers of the decline. Villages and small cities near regional centres are predicted to be less affected by this trend, such that more metropolitan regions emerge. The population decline in areas that are already economically depressed will increase the debt of these communities due to the decline in tax revenues and the underutilization of infrastructure. The influx of people to (semi-) urban areas will overload the ageing infrastructure of those regions.

Possible entry points for resource policy

- Support of and cooperation with citizens' initiatives for sustainability transformations; city governments should provide space for initiatives
- Education and awareness to counteract alienation from nature
- Recognise ageing infrastructure as a window of opportunity: new construction and renovation according to exacting sustainability criteria in order to create green lock-in effects
- Public procurement according to high sustainability criteria
- Ecological restoration of abandoned buildings and unused infrastructure in peripheral areas, merge shrinking cities where possible
- Use the economic potential of generating renewable energy in rural areas; citizen involvement in the infrastructure of energy turnaround (wind farms, electricity grids, etc.) to increase acceptance
- Combat urban sprawl and encourage higher density through promotion of polycentric mixed-use (work and live) as well as the redesign of existing living habits (themes: commuter tax, housing supplement, age-appropriate flexibility, etc.), rebuild car cities and design more sustainable transport concepts

Links to other trends



Literature

[1] UNDESA, 2012. World Urbanization Prospects. The 2011 Revision. Highlights, United Nations, New York.

[2] Satterthwaite, David (et al.), 2009. Adapting to Climate Change in Urban Areas: the Possibilities and Constraints in Low-and Middle-Income Nations, IIED, London.

[3] Glaeser, Edward, 2001. Triumph of the City: How Our Greatest Invention Makes Us Richer, Smarter, Greener, Healthier, and Happier, Penguin Press, New York.

[4] UN System Task Team on the Post-2015 UN Development Agenda, 2012. Sustainable urbanization. Thematic Think Piece UN Habitat. URL http://www.google.de/url?sa=t&rct=j&q=&esrc=s&source=web&cd=1&ved=0CCQQFjAA&url=http%3A%2F%2Fwww.un.org%2Fmillennumgoals%2Fpdf%2FThink%2520Pieces%2F18_urbanization.pdf&ei=zZWhU8iaBoL_ywOo9YDYBw&usg=AFQjCNHn3mMTfofhq-VyNodujnCib6EhCQ&bvm=bv.69137298,d.bGQ&cad=rja.

[5] Alberti, Marina, 2010. Maintaining ecological integrity and sustaining ecosystem function in urban areas, Environmental Sustainability, 2:178–184.

[6] Dobbs, Richard (et al.), 2011. Urban world: Mapping the economic power of cities, McKinsey Global Institute.

[7] Statistisches Bundesamt, 2013. Statistisches Jahrbuch 2013, Wiesbaden.

[8] City of Copenhagen, Technical and Environmental Administration, 2012: CPH 2025, Copenhagen.

[9] UC Berkeley CoolClimate Network, Average Annual Household Carbon Footprint, 2013. URL http://coolclimate.berkeley.edu/maps, retrieved on 19.6.2014.

[10] Dodman, David, 2009. Blaming cities for climate change? An analysis of urban greenhouse gas emissions, Environment and Urbanization, 21:185.

[11] United Nations, Department of Economic and Social Affairs, Population Division, 2012. World Urbanization Prospects: The 2011 Revision. CD-ROM Edition – Data in digital form (POP/DB/WUP/Rev.2011).

[12] IPCC, 2014. Climate Change 2014. Impacts, Adaptation, and Vulnerability. Impacts. Volume 1: Global and Sectoral Aspects. WGII AR5 Final Drafts (accepted), Part A.

[13] Berlin-Institut für Bevölkerung und Entwicklung, 2011. Die Zukunft der Dörfer. Zwischen Stabilität und demografischem Niedergang, Berlin.

[14] Hoornweg, Daniel/Freire, Mila, 2013. Main report. Vol. 1 of Building sustainability in an urbanizing World: a partnership report. Urban development series; knowledge papers no. 17. Washington DC; World Bank.

[15] Hakelberg, Lukas, 2011. Governing Climate Change by Diffusion. Transnational Municipal Networks as Catalysts of Policy Spread, FFU-Report 08-2011.

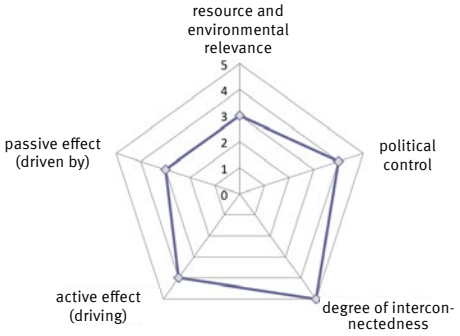
[16] OECD/China Development Research Foundation, 2010. Trends in Urbanisation and Urban Policies in OECD Countries: What Lessons for China?, OECD Publishing. doi: 10.1787/9789264092259-en.

[17] Satterthwaite, David, 2009. Big emitters: how growth in consumption drives climate change, iied briefing, http://pubs.iied.org/17077IIED.html.

Trend theme 2

Socio-economic acceleration

Western growth models and lifestyles are increasingly spreading to emerging economies and developing nations. Economic and social developments are increasingly growth-oriented and faster. The educational system is becoming economised. Work processes are increasingly digital and are more compact – health problems are on the rise.



Status quo

With the world economy having largely recovered from the global financial crisis, a focus on increasing economic growth continues to be the top political goal. Western lifestyles dominate international trade and lead to significant resource requirements and environmental impacts [1, 2]. The pace of technological advancement and innovation has accelerated [3]. Although the average work week decreased considerably in the past century, many countries have seen an increase in the past 15 years – examples include Germany, Japan and the USA [4]. Many workers experienced an increasingly "tight" working day, characterised by more tasks that are also more complex and must be dealt with simultaneously. In response, small-scale (social) counter movements have emerged that follow an alternative, more sustainable or simpler lifestyle.

Resource and environmental relevance of the trend theme

With the spread of Western consumption and production patterns, the need for material and energy as well as infrastructure development has grown considerably [27, 28, 29]. For example, per capita demand for materials has risen from 8 to 16 tonnes [2][9], energy use (dominated by fossil sources) by 80% [30] and global greenhouse gas emissions by 50% [31]. Consumption of land area, destruction of habitat, land degradation and the loss of forest and agriculture land continue to be the results of this increase in resource use [30, 32]. As climate change progresses, its effects are increasingly visible and tangible – mainly in more vulnerable regions of developing nations, but increasingly also in industrial and BRICS nations [33].

Estimates that take into consideration planned infrastructure obsolescence indicate that in the year 2010 around 6–13 million tonnes of waste (77 to 164 kg waste per capita), were generated in Germany [18].[10] Accelerated product life cycles and planned obsolescence also contribute to the generation of municipal waste – globally, an increase from 1.3 billion tonnes in 2012 to 2.2 billion tonnes in 2025, or 1.2 to 1.42 kg per person per day, is expected [34].

Emerging tendencies towards deceleration and a well-being-oriented, more sustainable lifestyle would allow for a reduction of the material consumption to 8 tonnes per capita; this would be achieved primarily by reduced vehicle use, smaller living spaces, an increase renewable energy use and an increase in vegetarian eating habits [26].

9 | From a business-as-usual scenario from UNEP (2011).
10 | The figures include municipal waste, waste from production and industry as well as secondary waste (waste from disposal processes, for example, from sorting plants, treatment plants and incinerating plants).

In motion: trends and developments

Rise in global economic growth

The economies of industrialised countries and BRICS countries have recovered from the global financial crisis [5]. Asia, particularly China and India, is the main force behind the global economy and will drive the expected threefold increase in global economic output by 2050: China and India are expected to account for half of global GDP by 2050, compared to around 10% in 2013 [6].

The spread of Western lifestyles

Increased incomes enable a growing number of people to change their lifestyles, and drives a "catching-up" to industrialised country standards in terms of basic and conspicuous consumption patterns in emerging economies and developing nations [7]. By 2050, 3 billion more middle-class consumers are expected, predominantly in Asia – they will adopt consumption decisions according to the prevailing production methods and consumption patterns of industrial nations [1, 8]. In this context, new free trade zones can be expected[11] to strengthen trade relationships and the unrestricted movement of goods and capital [9].

Consolidation and acceleration of global capital flow

Global capital flows continue to rise, and there is an increasing decoupling of the financial sector from the "real" economy, i.e. production and services. While gross national product saw a five-fold increase between 1980 and 2007, global capital investments increased 16-fold [10]. Growth in international capital flows between 1994 and 2007 was three times the growth in global trade [11]. This cash flow is increasingly developing its own momentum, which is detached from social added value and leads to a stronger disparity between social and financial markets[12] (see also trend theme "finance").

Increase in digital networking of knowledge resources and work processes

The rise in automation and digitised networking of knowledge resources and work processes has increased the pace of technical and scientific innovations [3, 12, 13]. On one hand, this has led to a perceived time squeeze[13] [14, 15], particularly for skilled workers and the professional classes (see also trend theme "working world"). On the other hand, development and product life cycles are becoming shorter, with increased product diversity as well as competition between companies for sales and customers [16]. In this context, advertising efforts are increasingly digitised, personalised and individualised [17], in order to keep up with the demand for new products (see also trend theme "marketing/consumption"). For many companies, this creates the need to lower product lifespan and quality through planned obsolescence while simultaneously boosting demand for new products as well as turnover and profitability [18]. The "squeeze" and increasing lack of time raise the demand for convenience products like ready-made meals [15, 19].

Marketisation of the educational system

The focus on economic growth, the increasing digitisation of work and free time, and the acceleration of innovation processes contribute to the marketisation of education systems as well as a strengthening of disciplines that yield economic growth, lead to future technology, and help ensure competitiveness [24] (see also trend theme "education"). In addition to economics and law, these disciplines include the STEM[14] subjects. The social sciences and humanities, on the other hand, are decreasing in importance. Due to optimisation efforts in education through performance standards and an increasing efficiency dimension,

11 | For example (1) the planned Trans-Pacific Partnership Agreement (TPP) between the USA and 11 countries in the Asia-Pacific region (Australia, Brunei, Chile, Japan, Canada, Malaysia, Mexico, New Zealand, Peru, Singapore and Vietnam), which should help American products and services to tap into new sales markets (see http://www.ustr.gov/tpp); (2) the planned Transatlantic Trade and Investment Partnership (TTIP) to ease trade and investments on both sides of the Atlantic (see http://www.bmwi.de/DE/Themen/Aussenwirtschaft/ttip.html); (3) Negotiations over a free trade agreement between China, Japan and South Korea aimed at favouring and further developing trans-national production and trade networks in Northeast Asia (see http://fta.mofcom.gov.cn/enarticle/chinarihen/chinarihennews/201301/11455_1.html) or (4) the processes for the establishment of a broad economic partnership agreement (Regional Comprehensive Economic Partnership, RCEP) between the ASEAN member states and the six partner countries Australia, China, India, Japan, New Zealand and South Korea (ASEAN+6, see http://www.asean.org/news/item/asean-framework-for-regional-comprehensive-economic-partnership).

12 | Personal interview as part of the SimRess project.

13 | These include, for example, more and increasingly complicated tasks with rising self-responsibility and less workers working on the tasks as well as the an increase in tasks being worked on simultaneously (psyGA, 2012).

14 | STEM stands for science, technology, engineering, mathematics degrees.

the pressure on students is mounting to be more effective and study faster [25]. As a result, curriculum vitae have become increasingly streamlined and leave little room for extracurricular commitments.

Countertrend: the emergence of more sustainable new modes of thought and world views

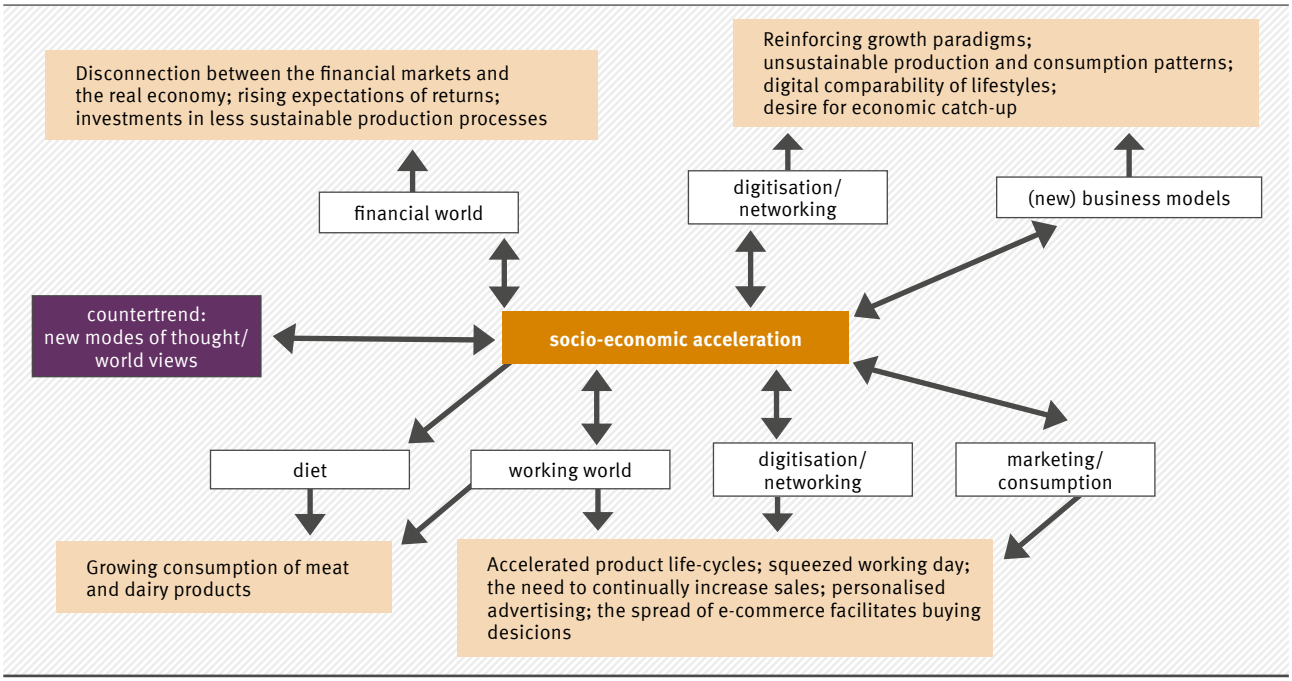
All this acceleration and density of labour and innovation processes, collectivisation of Western production and consumption patterns, and progressing environmental degradation has given rise to increasing criticism of the Western economic model. Such criticism manifests itself in new world views and lifestyles that focus on slowing down, well-being and sustainability, for example, permaculture, transition towns and shareconomy approaches [26] (also see trend topic "new modes of thought /world views"). In this context, (digital) social networks are becoming increasingly important and, for a smaller group of people, can replace material status and standard of living as indicators of success and quality of life. Effects include an increase in bartering and growth in direct exchange of goods and services among self-employed individuals via digital (e.g. Dawanda) and social platforms. Students of economics are increasingly calling for a revision of neoliberal economic models in the teaching of their subject,[15] which is giving rise to an increased exchange about economic theory that is establishing itself in niches and focuses on well-being and empiricism of the common good.[16]

Possible entry points for resource policy

- A shift of focus in political goals from economic growth to well-being, including funding for corresponding indicator sets
- Promote more sustainable production and consumption patterns through dynamic, performance-based product and production standards as well as a reduction of VAT rates for sustainable products and services
- Strengthen sustainability criteria in public procurement
- Extended warranty liability and changed frameworks for product and process design
- Promotion of supportive framework conditions for alternative business models such as, for example, product-service systems
- Education for sustainable development to strengthen more sustainable consumption and behaviour patterns

15 | See an open letter from the International Student Initiative for Plural Economics (65 economics student's associations from over 30 countries), http://www.isipe.net/open-letter/, seen on 18.06.2014.
16 | E.g. at Leuphana University of Lüneburg and Carl von Ossietzky University of Oldenburg.

Links to other trend themes



Literature

[1] Enquete-Kommission „Wachstum, Wohlstand, Lebensqualität – Wege zu nachhaltigem Wirtschaften und gesellschaftlichem Fortschritt in der Sozialen Marktwirtschaft“, 2013. Schlussbericht. Deutscher Bundestag, 17. Wahlperiode, Drucksache 17/13300.

[2] UNEP, 2011. Decoupling natural resource use and environmental impacts from economic growth, A Report of the Working Group on Decoupling to the International Resource Panel.

[3] EEA, 2014a. Accelerating technological change: racing into the unknown. URL http://www.eea.europa.eu/soer-2015/global/technology, retrieved on 20.6.2014.

[4] Lee, S.-H./McCann D./Messenger J.C., 2007. Working time around the world: trends in working hours, laws and policies in a global comparative perspective. Studies in the Modern World Economy, Routledge.

[5] Shrestha, M. and Marini, M., 2013. Quarterly GDP Revisions in G-20 Countries: Evidence from the 2008 Financial Crisis. IMF Working Paper WP/13/60.

[6] EEA, 2013a. Assessment of global megatrends — an update. Global megatrend 5: Continued economic growth? European Environment Agency, Copenhagen.

[7] McKinsey Global Institute, 2011. Resource revolution: meeting the world‘s energy, materials, food and water needs. November 2011.

[8] EEA, 2014b. From a unipolar to a multipolar world. URL http://www.eea.europa.eu/soer-2015/global/trade, retrieved on 20.6.2014.

[9] Luft, C., 2010. Verselbständigung der Finanz- gegenüber der Realwirtschaft – Überakkumulation als Krisenquelle. Sitzungsberichte der Leibniz-Sozietät der Wissenschaften zu Berlin. 107(2010), 37–54.

[10] OECD, 2011. OECD-Wirtschaftsausblick, Vol. 2011/1. OECD-Publishing.

[11] Brynjolfsson, E./McAfee A., 2012. Thriving in the Automated Economy. The Futurist, March–April, 27–31.

[12] Glanz, A./Nadler, P., 2011. Entscheiderstudie zur steigenden Innovationsgeschwindigkeit. Innovationen Institut, Frankfurt am Main, März 2011.

[13] Fagnani, J., 2012. Work-family life balance: future trends and challenges. In: OECD, 2012. The Future of Families to 2030, OECD Publishing, 119–188.

[14] Rosa, H., 2010. Beschleunigung. Die Veränderung der Zeitstruktur in der Moderne, Frankfurt/M.: Suhrkamp.

[15] Braun-Thürmann, H., 2008. Beschleunigung, Globalisierung und Innovation. In: Barske, H. (et al.) (Ed.). Digitale Fachbibliothek Innovationsmanagement, Kapitel 01.01.07. Symposion Publishing

[16] LfM (Landesanstalt für Medien NRW), 2012. Digitaltrends LfM. Personalisierung. Ausgabe 1, 2012.

[17] Schridde, S./Kreiß, C., 2013. Geplante Obsoleszenz. Gutachten im Auftrag der Bundestagsfraktion Bündnis 90 / Die Grünen.

[18] SevenOne Media, 2007. TrendReport Convenience. Unterföhring.

[19] psyGA, 2012. Kein Stress mit dem Stress. Lösungen und Tipps für Führungskräfte und Unternehmen. Essen.

[20] BPtK, 2012. BPtK-Studie zur Arbeitsunfähigkeit. Psychische Erkrankungen und Burnout. Berlin.

[21] DAK, 2009. Gesundheitsreport 2009. Analyse der Arbeitsunfähigkeitsdaten. Schwerpunktthema Doping am Arbeitsplatz. Hamburg.

[22] EU-OSHA, 2009. OSH in figures: stress at work — facts and figures. European Risk Observatory Report 9, Luxembourg.

[23] Höhne, T., 2012. Ökonomisierung von Bildung. In: Bauer, U. (et al.) (Ed.). Handbuch Bildungs- und Erziehungssoziologie. Bildung und Gesellschaft, Verlag für Sozialwissenschaften, pp 797–812.

[24] Krautz, J., 2007. Pädagogik unter dem Druck der Ökonomisierung. Zum Hintergrund von Standards, Kompetenzen und Modulen. Pädagogische Rundschau 1/2007, S. 81–93.

[25] SPREAD, 2012. European Lifestyles. The Future Issue. Final Report SPREAD Sustainable Lifestyles 2050 project.

[26] EEA, 2013b. Assessment of global megatrends — an update. Global megatrend 2: Living in an urban world. European Environment Agency, Copenhagen.

[27] Rathe, A.A./Prpich, G.P./Shaw, H./Delgado, J./Garnett, K./ Chatterton, J.C./Lickorish, F./Pollard, S.J.T., 2012. Annual Key Factors Report 2013. Cranfield University, UK.

[28] UNEP, 2012. 21 Issues for the 21st Century: Result of the UNEP Foresight Process on Emerging Environmental Issues. United Nations Environment Programme (UNEP), Nairobi, Kenya.

[29] van den Berg, M., 2011. EU Resource Efficiency Perspectives in a Global Context. The Hague: PBL Netherlands Environmental Assessment Agency.

[30] OECD, 2012. OECD Environmental Outlook to 2050: The Consequences of Inaction. OECD, Paris.

[31] EEA, 2013c. Assessment of global megatrends — an update. Global megatrend 8: Growing demands on ecosystems. European Environment Agency, Copenhagen.

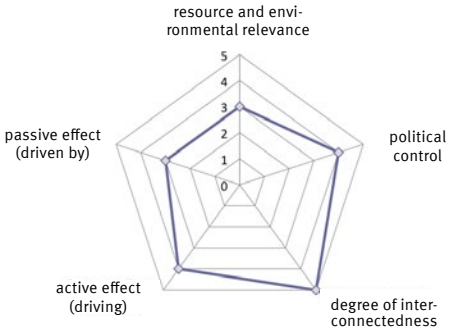
[32] IPCC, 2014. Summary for policy makers. In: Climate Change 2014: Impacts, Adaptation, and Vulnerability. Part A: Global and Sectoral Aspects. Contribution of Working Group II to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change.

[33] World Bank, 2012. What a waste. A Global Review of Solid Waste Management. Urban Development Series Knowledge Papers, No. 15, Washington, March 2012.

Trend theme 3

Working world

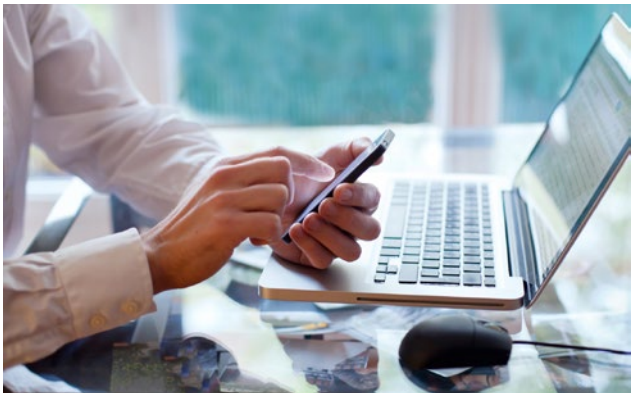
The labour market in Germany is strongly influenced by demographic change. The need for skilled workers is increasing, and unskilled workers are at a disadvantage on the labour market. The everyday work life of the highly qualified is accelerating and traditional career paths are on the wane.



Status quo

In early 2014, nearly 42 million people in Germany were employed, 29.3 million in a job contributing to the (compulsory) social security system. About 2.9 million people (6.6%) were unemployed [1]. The employment rates stands at 76% for 20–64 year olds (women: 71%). The pay gap between men and women is around 23% and is one of the highest in Europe [2]. One third of German women work in atypical employment relationships.[17] The service sector has been expanding for decades: in 1970 around 45% of the working population[18] worked in the service sector, today it is over 30 million people – nearly three quarters of the labour force [3, 4]. The number of people employed in manufacturing, industry, agriculture and forestry – as well as those sectors' contribution to GDP – has decreased over that same time period. In the last decade, the number of people employed in those sectors has remained stable, however [3].

The work load has remained the same since the mid-70s [5]. As a strong export nation, German economic developments – and with them, the labour market - are dependent on the global economy and its demand. In Europe, the unemployment rate is nearly 10%. Youth unemployment presents a challenge in Europe and across the world [6, 7].



Resource and environmental relevance of the trend theme

The social significance of work is of major importance for resources and the environment. Work helps create material well-being, however, the well-being of people only increases to a certain degree with the per capita income [15]. The acceleration of working processes, shorter product cycles and further automation of production processes lead to to an increased consumption of resources. A time squeezed workday, increase in time poverty and financial wealth can lead to compensatory consumption. In the past, an increase in efficiency within the industry branch was usually exhausted by rebound effects.

17 | The "atypically employed" are people who have no standard employment relationship, in other words, part-time work for 20 hours or less, minor or temporary employment, or temporary work [3].
18 | West Germany.

In motion: trends and developments

Service and knowledge society

German demographics are changing. People are growing older, the percentage of the population accounted for by the elderly is rising and, at the same time, the total population is decreasing in absolute terms. Migration can lessen this development, however, in the future it will no longer fully offset it – there is hardly any migration in the rural areas deeply affected by this demographic change [8]. This situation is having an increasing effect on the labour market [9]. The occupational fields of "health care, social services and education", "construction and building technology," as well as "mechatronics, energy and electronics" lack qualified workers. Bottlenecks exist at all levels of qualification, although the percentage is particularly high for university-educated workers [10]. Lack of workers in service professions such as nursing can be partly traced back to the lack of recognition and poor payment of these professions [11]. The overall need for unskilled workers, who have been particularly affected by unemployment and marginal employment, has dropped. Entry barriers to the labour market are increasing and, with them, training and educational requirements. Inequalities between highly skilled and low-skilled workers lead to increasing social tensions; the gap between rich and poor is growing ever wider. Because fewer young people are entering the labour market, working lifetimes are currently being extended and the retirement age has shifted. As a result, the working day is increasingly adapted to the needs of older workers. At the same time, Generation Y can have more of an impact on the labour market: more flexible working times as well as a better work-life balance are gaining in importance. Rapid technological developments have increased the significance of life-long learning. Germany is turning into a society of information and knowledge. Service careers continue to increase, whereas industry is becoming automised (artificial intelligence, robotics, etc.) and replacing jobs in production, a trend that is also making headway in knowledge work (also see trend theme "digitisation and networking").

An accelerated working world

The high degree of automation and digitisation in the workplace has led to a further increase of efficiency in workflows. Very fast communication as well as digitised and global business calls for making extremely quick decisions practically round the clock. The trend of increasing flexibility (in terms of time with flexible hours and in terms of place through mobile work) strengthen this acceleration. Work pressure has led to an increase in health problems. Psychosomatic illness, illness-related absences, and human error are on the rise and cause a loss of quality and productivity – as an example, burnout-related leaves of absence in Germany went up 7-fold between 2004 and 2012 [12, 13]. Skilled workers in particular resort to performance enhancing drugs in order to keep pace with growing demands [14].

Multi-optionality

Professional and private lives are no longer developing linearly. Various activities that once were kept separate have been integrated and are carried out simultaneously. Generalists with the capacity for networked thinking and meta-competencies, such as problem-solving strategies, are in demand – however, training and university systems are lagging behind this demand. The trend towards independence and project work is changing the work ethic – marketing oneself is becoming more important, and this individualisation can weaken traditional workers' rights. In certain branches – primarily IT – traditional employment relationships are blurred by projects and services advertised worldwide, which in turn increases workloads and the act of wage dumping. As a counterbalance, societal "feminisation" fueled by increasing education equality – (see also trend theme "new modes of thought/world views"). Work-life balance is becoming a serious issue.

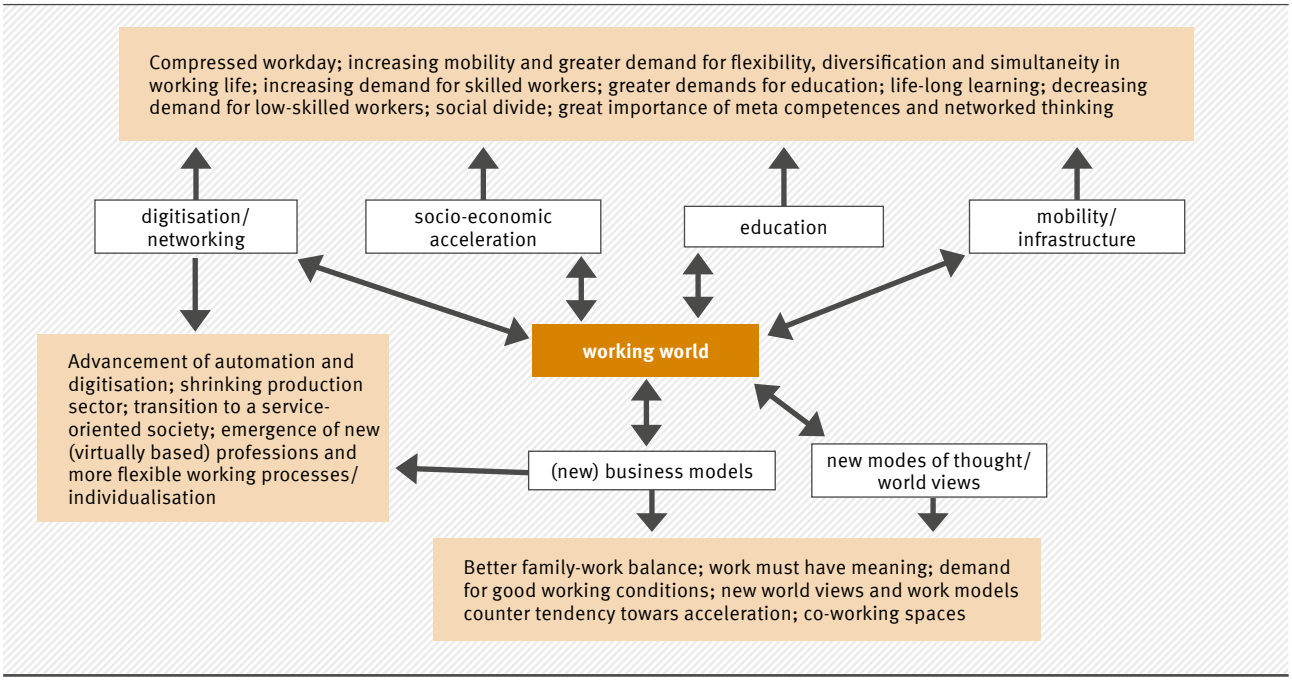
Technical influences

New working worlds driven by technological developments are emerging in which a traditional education is less relevant. Bloggers, video artists and Internet journalists have entered the market and influence public opinion – print media is on the decline. Technical innovations like 3D printing, offer new design and work possibilities for individuals who previously required much infrastructure and know-how. The concept of a "workforce" is being replaced by new models: freelancers and founders come together in co-working spaces, which turn into centres of innovation. Social aspects and community organisation plays an important role. Such affiliations are often organised as a cooperative with alternative decision-making processes (sociocracy).

Possible entry points for resource policy

- Foster debate about work and working time: work and consumption should not be an end in itself
- Support change to a service society, which values certain professions, for example, nursing care and educator jobs, but also green jobs
- Integrate staff – vegetarian day in canteens, fund public transportation tickets, provide environmental information in companies
- Information and consulting services on resource efficiency for businesses

Links to other trend themes



Literature

[1] Statistisches Bundesamt, 2014. 42,1 Millionen Erwerbstätige im Mai 2014. URL https://www.destatis.de/DE/ZahlenFakten/GesamtwirtschaftUmwelt/Arbeitsmarkt/Erwerbstaetigkeit/AktuellMonat.htm, retrieved on 24.07.2014.

[2] Eurostat, 2013. Schlüsseldaten über Europa. Kurzfassung 2013 des Online – Jahrbuchs von Eurostat, Luxemburg: Amt für Veröffentlichungen der Europäischen Union.

[3] Statistisches Bundesamt, 2013. Statistisches Jahrbuch 2013, Wiesbaden.

[4] Statistisches Bundesamt, 2014. Konjunkturstatistik 2013: Mehr Beschäftigte im Dienstleistungsbereich. URL https://www.destatis.de/DE/ZahlenFakten/Wirtschaftsbereiche/Dienstleistungen/Dienstleistungen.html, retrieved on 24.07.2014.

[5] Kopatz, Michael, 2012. Arbeit, Glück und Nachhaltigkeit. Warum kürzere Arbeitszeiten Wohlbefinden, Gesundheit, Klimaschutz und Ressourcengerechtigkeit fördern, Wuppertal Institut für Klima, Umwelt, Energie GmbH, Wuppertal.

[6] Statistisches Bundesamt, 2012. Frauen und Männer auf dem Arbeitsmarkt. Deutschland und Europa, Wiesbaden.

[7] Ortiz, Isabel/ Cummins, Matthew, 2012. When the Global Crisis and Youth Bulge Collide. Double the Jobs, Trouble for Youth, UNICEF Social and Economic Working Paper, New York.

[8] Bruckner, Elke, 2012. Migration und demographischer Wandel, Bertelsmann Stiftung, Gütersloh.

[9] Robert Bosch Stiftung (Hrsg.), 2013. Die Zukunft der Arbeitswelt. Auf dem Weg ins Jahr 2030, Stuttgart.

[10] Bundesministerium für Wirtschaft und Energie, 2014. Fachkräfteengpässe in Unternehmen. In vielen Berufsgattungen bestehen seit längerem Engpässe, Berlin.

[11] Heidemann, Winfried, 2012. Zukünftiger Qualifikations- und Fachkräftebedarf Handlungsfelder und Handlungsmöglichkeiten, Hans Böckler Stiftung.

[12] psyGA, 2012. Kein Stress mit dem Stress. Lösungen und Tipps für Führungskräfte und Unternehmen. Essen.

[13] BPtK, 2012. BPtK-Studie zur Arbeitsunfähigkeit. Psychische Erkrankungen und Burnout. Berlin.

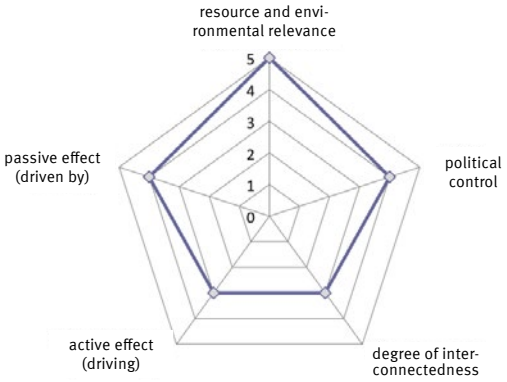
[14] The Academy of Medical Sciences, 2012. Human enhancement and the future of work.

[15] Hirsch, Fred, 1980. Die sozialen Grenzen des Wachstums, Reinbek.

Trend theme 4

Resource governance

Economically relevant raw materials are becoming scarcer, and available reserves exceed peak production in the coming decades. Resource extraction is increasingly controlled by the government and, thus, is also supported with research funding. To counter scarcity and reduce dependency on raw material imports, unconventional production technologies for energy commodities are being funded.



Status quo

Resource governance refers to the coordination and regulation of access and how to handle various stakeholders in terms of natural resources. The coordination between stakeholders takes place in a complex multi-level system at local, national and up to global level [1]. The primary goal of state and non-state stakeholders is the allocation and provision of resources in order to control resulting profits. This control may be exercised through cooperation, exclusion or confrontation [2].

An example of the importance of resource governance is the dispute Japan and the USA brought to the World Trade Organization regarding China's introduction of export ratios for rare earths. This national measure shows an example that the governments of emerging and developing nations are increasingly nationalising their domestic raw materials sector through erecting barriers to trade. Thus, the scarcity of many economically important raw materials should be countered.

Resource and environmental relevance of the trend theme

The increase in conflicts between resource-importing countries has implications for Germany, as it is dependent on imports from third countries due to small national reserves of raw materials. Germany has increased its research and innovation expenditure in the field of resource efficiency accordingly – particularly in increased reuse and substitutes for substances – in order to reduce dependency on imported raw materials. At the same time, technology transfer of resource-saving technologies from Germany and other countries is increasingly occurring to also reduce the existing dependency on imports and develop more efficient production processes.

Through the use of unconventional extraction technologies, contamination of soil as well as groundwater is expected to increase [23]. The available amount and quality of both of these resources will thus be affected, which will entail, for example, heavy pollution and salinisation in many regions of the world. Because most of the economically relevant raw materials are found in the southern hemisphere, [24] people from emerging and developing nations will especially suffer from progressive degradation.

In motion: trends and developments

Increasing scarcity of relevant raw materials

Many economically relevant and critical raw materials are growing increasingly scarce – at an EU level, 14 raw materials (e.g. indium, platinum group metals and rare earths) have been identified as critically scarce [3]. In Germany, there are 13 with a high to highest criticality, e.g., rare earths, tungsten, palladium, germanium, rhenium and antimony [4]. The global demand for many of these raw materials will considerably increase due to future technology (particularly in the fields of renewable energies, energy efficiency and electric mobility). Increases from 2006 levels to those expected in 2030 include: 234 tonnes of indium to 1,911 tonnes (~+ 800 %); 4,000 tonnes of neodymium to around 28,000 (~+ 600 %); 23 tonnes of palladium to 77 tonnes in 2030 (~+ 200 %); and 28 to 220 tonnes for germanium (~+ 600 %) [3].

In addition, scarcities will also be seen in other raw materials such as gold, silver, zinc, lead or tin as well as mass metals like copper or iron – with the use of today's technology and production rates, the available reserves are to some extent only enough for around 20 more years [5, 6]. The copper production will exceed its peak production between the years 2030–2060 and will only be accessible at significantly higher costs; copper recycling will represent the lion's share of the copper supply [7]. However, the scarcity of the raw materials has less to do with their geological availability, and much more with whether they are (still) economically viable and safely available due to political instabilities in the export countries and their respective environmental and social impacts [6]. As an example, the ore grade in many raw materials deposits is decreasing globally which increase not only the cost of production (human resources, material and energy) but also of the tonnes of rocks that must be removed [5, 6].

Increase in North-South trade relations

The raw materials needed for future technologies are mainly extracted in southern or (far) east countries such as Brazil (e.g. tantalum), the Democratic Republic of Congo (e.g. copper), South Africa (platinum group metals), Guinea (e.g. bauxite), China (e.g. rare earths), Russia (nickel) or Kazakhstan (e.g. chrome) [3, 4, 8]. North-South trade relations, which function and are based on international cooperation, are therefore gaining in importance [9]. Large portions of the southern populations continue to be barred from profit in this process which largely flows to the elites. The negative effect of raw material extraction additionally worsens the situation of the already vulnerable, poorer population [9, 10].

Government controlled funding of raw materials

Countries rich in raw materials are increasingly limiting the export of raw materials. On the one hand, this is for skimming off profits; on the other hand, the reasons are also politically motivated. In part, the industry utilising raw materials is also increasingly developing in the countries where the raw materials are located. Moreover, raw material sectors are increasingly being nationalised to give the government control over raw materials and the profits from export and trade – as has happened in, for example, Bolivia, Venezuela and Ecuador [11]. Raw material policy is becoming more protectionist in terms of the introduction of export duties or quotas. The geopolitical potential for conflict is thus rising between the resource-importing and resource-exporting countries – going as far as armed conflicts over resources (in addition to or as military engagements for humanitarian reasons) [12].

Increased transparency in the raw material supply chain

The EU has decided on a guideline to strengthen transparency of cash flows and trade linkages in the raw material supply chain similar to the US Dodd–Frank Wall Street Reform and Consumer Protection Act (Dodd-Frank Act) based on the OECD Due Diligence Guidance [13]. The EU wishes to support developing nations in generating higher government revenue from their resource wealth which they should then invest in education, infrastructure and environmental protection [13]. At the same time, the implementation and effects of these transparency guidelines on national populations are being critically discussed, particularly cases in which the governments of resource wealthy countries are problematic partners or when companies completely avoid raw materials from certain regions [25].

Expansion of unconventional extraction technologies

In order to reduce dependency on imports and, consequently, to reduce the vulnerability of rising or volatile raw material prices, many countries are improving their research and development efforts and creating policy frameworks for plans which are aimed at the development of unconventional energy and raw material sources. This applies particularly to the expansion of deep-sea drilling for oil and natural gas as well as extraction methods such as fracking and enhanced oil recovery [14, 15]. These plans also foster innovative research projects which enable resource-saving of renewable resource, such as the production of biomass from algae [16] and the use of CO_2 as an alternative component for industrial processes and chemical products [17, 18].

Targeted expansion of raw material extraction

In order to ensure the availability of raw materials for innovation of future technologies and avoid supply difficulties, countries have a targeted technology support policy. Through early analysis of raw material requirements for technological innovation, significant shortages of raw materials will be identified and the respective extraction technology will be developed or targeted research will be promoted to open up potential for substitution [19].

Decentralising resource governance

In Germany, an extensive increase in the remunicipalisation of energy production is occurring. This trend is facilitated due to the expiring concession agreements between municipalities and energy providers at the local level in Germany [20]. This offers the possibility for affected municipalities to end agreements with their providers and directly play a part in energy policy once again.

Increasing link between raw material and financial markets

Through the decisions of institutional investors to invest in commodity markets, raw material and financial markets are becoming increasingly linked with one another. Between 2003 and 2008, investments in commodity markets rose from EUR 13 billion to EUR 170–205 billion [21]. While investment sums had declined during and directy after the financial crisis, by 2010 investments had once again doubled compared to 2008 [22] (also see trend theme “financial world”).

Possible entry points for resource policy

- Align raw material partnerships and raw material trade policy with ecological and social criteria; debate and push for European standards
- Awareness raising and vocational training for early identification of shortages of certain resources
- Targeted technology funding as well as research funding for fossil fuel substitution and other important raw materials
- Strengthen transparency of the supply chain through certification obligations and agreements
- Fostering sustainable raw material extraction (maintain ecosystem services and socially inclusive extraction) and agreements on corresponding extraction standards

Links to other trend themes

Literature

[1] Pahl-Wostl, Claudia, 2009. A conceptual framework for analysing adaptive capacity and multi-level learning processes in resource governance regimes. Global Environmental Change 19, 354–365.

[2] Groß, Franziska (et al.), 2010. Ressourcengovernance. In: Mildner, Stormy-Annika (Hrsg.): Konkurrenz um knappe Ressourcen, Berlin 2010, S. 20–25.

[3] European Commission, 2010. Critical raw materials for the EU. Report of the Ad-hoc Working Group on defining critical raw materials.

[4] IZT/adelphi, 2011. Kritische Rohstoffe für Deutschland. „Identifikation aus Sicht deutscher Unternehmen wirtschaftlich bedeutsamer mineralischer Rohstoffe, deren Versorgungslage sich mittel- bis langfristig als kritisch erweisen könnte“. Im Auftrag der KfW Bankengruppe. Berlin.

[5] McKinsey Global Institute, 2011. Resource revolution: meeting the world‘s energy, materials, food and water needs. November 2011.

[6] PBL, 2011. Scarcity in a Sea of Plenty? Global Resource Scarcities and Policies in the European Union and the Netherlands. The Hague.

[7] Sverdrup, Harald (et al.), 2014. On modelling the global copper mining rates, market supply, copperprice and the end of copper reserves. Resources, Conservation and Recycling 87 (2014) 158–174.

[8] Lambert, Anne/Hirschnitz-Garbers, Martin, 2014. Ressourceneffizienz und High-Tech-Materialien. Kurzanalyse 10 im Projekt Ressourcenpolitik: Analyse der ressourcenpolitischen Debatte und Entwicklung von Politikoptionen (PolRess).

[9] Stiftung Neue Verantwortung, 2011. Kein Kampf um Rohstoffe: Die Zukunft der Industriepolitik liegt in internationaler Kooperation und Regulierung. Policy Brief 05/11, Berlin.

[10] WBGU, 2011. Welt im Wandel. Gesellschaftsvertrag für eine große Transformation. Berlin.

[11] Berrios, Ruben (et al.), 2011. Explaining hydrocarbon nationalization in Latin America: Economics and political ideology. Review of International Political Economy 18, 673–697.

[12] Tänzler, Dennis/ Westerkamp, Meike, 2010. Rohstoffkonflikte nachhaltig vermeiden: Konfliktrisiken bei Zugang und Nutzung von Rohstoffen, Berlin.

[13] Mildner, Stormy-Annika/ Wassenberg, Florian, 2012. Rohstoffreichtum darf nicht länger arm machen. Warum die EU-Mitgliedstaaten strengere Regeln für die Offenlegung von Zahlungen im Rohstoffsektor unterstützen sollten. SWP-Aktuell 43, Juli 2012.

[14] Jia, Chengzao (et al.), 2012. Unconventional hydrocarbon resources in China and the prospect of exploration and development. Petroleum Exploration and Development 39, 139–146.

[15] Institute for 21st Century Energy and U.S. Chamber of Commerce, 2012. CO_2 Enhanced Oil Recovery. Washington D.C.

[16] Fraunhofer-Institut für Grenzflächen- und Bioverfahrenstechnik, o.J. Algen – Nachhaltige Rohstoffquelle für Wertstoffe und Energie.

[17] Bringezu, Stefan, 2013. Carbon Recycling for Renewable Materials and Energy Supply. Recent Trends, Long-Term Options, and Challenges for Research and Development. Journal of Industrial Ecology 18, 327–340.

[18] Styring, Peter (et al.), 2011. Carbon Capture and Utilisation in the green economy. Using CO_2 to manufacture fuel, chemicals and materials, York.

[19] Angerer, Gerhard (et al.), 2009. Rohstoffe für Zukunftstechnologien Einfluss des branchenspezifischen Rohstoffbedarfs in rohstoffintensiven Zukunftstechnologien auf die zukünftige Rohstoffnachfrage, Karlsruhe.

[20] Schirg, Oliver, 2013. Rekommunalisierung von Energienetzen liegt im Trend, in: Hamburger Abendblatt, 06.09.2013, http://www.abendblatt.de/hamburg/article119760390/Rekommunalisierung-von-Energienetzen-liegt-im-Trend.html, retrieved on 24.06.2014.

[21] Enquete-Kommission „Wachstum, Wohlstand, Lebensqualität – Wege zu nachhaltigem Wirtschaften und gesellschaftlichem Fortschritt in der Sozialen Marktwirtschaft“, 2013. Schlussbericht. Deutscher Bundestag, 17. Wahlperiode, Drucksache 17/13300.

[22] European Commission, 2011. Tackling the challenges in commodity markets and on raw materials. COM(2011) 25 final.

[23] UNEP Global Environmental Alert Service (GEAS), 2012. Resource Efficiency, Harmful Substances and Hazardous Waste, Genf.

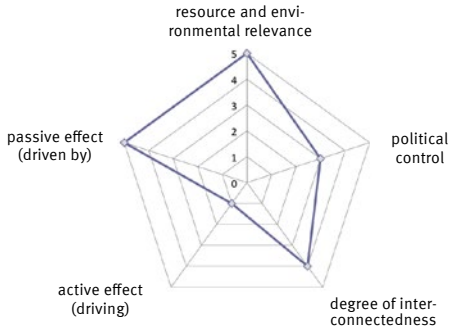
[24] Bundesministerium für wirtschaftliche Zusammenarbeit und Entwicklung (BMZ), 2010. Entwicklungsfaktor extraktive Rohstoffe. Ein Positionspapier des BMZ, Berlin.

[25] Johnson, Dominic, 2014. Der Kongo steckt im Detail. URL http://http://www.taz.de/1/archiv/digitaz/artikel/?ressort=hi&dig=2014%2F05%2F31%2Fa0144&cHash=967cd997c93a06f6b178eb270e81dd4c, retrieved on 25.07.2014.

Trend theme 5

Diet

Global consumption of animal products is increasing. In Germany, the demand for convenience and lifestyle products is on the rise. At the same time, sustainable dietary patterns and self-supply approaches are spreading along with demands for sustainable and transparent supply chains and products.



Status quo

In 2008, 39% of the grain available worldwide and 41% of animal protein was consumed in developed countries, where only 18% of the world's population lives [1]. A high number of obese people is a result of this overconsumption [2]. In contrast, 870 million people worldwide were chronically undernourished between 2010 and 2012, of these 852 million were in developing nations [3]. A third of all food produced worldwide is lost or wasted [1]. In Germany, 82kg of food per capita are thrown away each year [4]. Global meat consumption went up by 62% between 1963 and 2003 [5].

Meanwhile, 33% of arable land worldwide is used to grow animal feed. Livestock farming claims 70% of all global pastures and fields if all relevant by-products (e.g. soybean oil cake) are included [6] – these uses compete with land use for direct food production. Thus far, systems for tracing the origin of food products cover only parts of the value-added chain [7]. In Germany, 2 to 9% of the population follow a complete vegetarian diet [15, 16]. At the same time, 7% of Germans consume highly processed and convenience food daily, 20% several times a week [4].

Resource and environmental relevance of the trend theme

The global increase of resource-intensive food consumption – particularly animal and processed products – has had a strong environmental impact. 9% of global CO_2 emissions, 37% of methane emissions and 8% of global water use can be traced back to livestock farming [21].

Animal husbandry as well as animal transport, feed and animal products lead to high greenhouse gas emissions. The packaging and cooling of animal and processed products additionally diminish the environmental balance. Globalised supply chains and transport routes of non-local products increase $C0_2$ emissions and energy requirements. The increased demand for soybean products due to increasing vegetarianism, feed and biofuel requirements also contribute the changes in land use [22]. Single-crop farming for feed production, with the use of heavy machinery, leads to humus deficiencies and destroys soil quality. The intensive use of fertilizers pollutes water bodies. The deforestation of (rain) forests to create pasture land destroys ecosystems.

On average, 10g of plant protein are needed for the production of 1g of animal protein, therefore, space and water requirements for meat production are significantly higher [23] than when the area is used directly for human consumption. From a holistic point of view, and after taking energy requirements and other mass flows into account, artificial meat is also not a sustainable alternative [14].

In motion: trends and developments

Increasing global consumption of animal products

The United Nations Food and Agricultural Organisation (FAO) expects a further increase in annual meat consumption in industrialised nations, from 88 kg/year between 1997 and 1999 to 100 kg/year per capita by 2030 [8]. Other studies point to a stagnating meat consumption in Europe and shifts to different kinds of meat in other industrialised countries [6]. There is a global trend towards more milk and meat consumption that is driven by the increasing income levels, urbanisation and international trade. Western dietary patterns are being adopted in emerging nations with a growing level of prosperity where processed foods and animal products are increasingly consumed [1, 5, 9]. Worldwide, the average per capita consumption of meat will rise from 39 kg/year in 2012 to 49 kg/year in 2050 [10]. The negative environmental impacts of increased animal product consumption will probably by far surpass the positive effects of other trends in the food industry towards greater sustainability.

Increase in lifestyle-oriented demand

In Germany, an indicator of socio-economic acceleration is the increase in demand of processed and convenience food products [11] (see also trend theme "working world"). The per capita consumption of frozen foods increased more than 170 percent between 1976 and 2006 [12]. Environmental aspects play a role in this trend but are subordinate to more frequently marketed aspects of lifestyle and health (fat free, sugar free, lactose free, gluten free, etc.) in terms of their effect on consumer decisions. In this manner frozen food seen as healthy, like fish and fruit, saw an increase in sales of 9.2% and 6.4%, respectively, between 2005 and 2006, while sales of dry finished products[19] decreased [12]. The synthetic manufacturing of food increasingly opens up new diet options and can, for example, replace conventionally produced meat [13, 14].

Healthy indulgence and food waste

German food consumption patterns are changing: the "Aldi effect",[20] a societal trend in which the price is the deciding factor when shopping for food, is weakening. More importance is being placed on the freshness, origin and quality of products [24]. Discount grocery stores are becoming more expensive [25]. For many years the incremental increase in the cost of food was lower than the consumer price index, but recently food has become more expensive. On average, Germans spend twelve percent of their income on food - this is, however, far below the EU average [26]. The number of sustainability-oriented consumers has risen to 18% [26]. The origin of food and food waste have become more important to the consumer [27]. Many initiatives address food waste: the "best before" date, for example is being debated and may be abolished altogether at the EU level for various foods [28]. However, many other causes for waste continue: perfectionist size, shape and color standards for natural products like fruits and vegetables, trade class, large packaging and improper storage among other reasons lead to the fact that 6.7 million tonnes of food are thrown away in Germany each year [29, 30]. Healthy eating demands, particularly the year-long availability and various types of fruit and vegetables, have a negative impact on the ecological balance. Negative environmental impacts are caused by both long transport routes, but also by long storage and cooling time of regional food [31].

19 | Dried soup and sauces, pasta, rice and sugar all count as dry processed products [12].
20 | See for example Matthias Horx, 1995. Trendwörter Lexikon, Econ.

Increasing transparency and sustainability in supply chains

Food scandals in recent years have strengthened consumer demands for transparency in Europe, and Germany – companies are under pressure to disclose their supply chains and take aspects of sustainability into account [7]. QR codes[21] and smartphone apps offer individual monitoring possibilities and improve transparency of food products. Their main objectives are health and animal welfare, but they also make it easier to identify sustainable products by communicating e.g. delivery distances, the ecological footprint or water rucksacks. In this way, the trend towards a more sustainable and conscious dietary pattern can be strengthened. At the same time, improved transparency increases willingness to pay higher prices for quality [7]. However, the increasing complexity and lack of clarity of globalised supply chains counteracts this and makes complete traceability and monitoring of products difficult [7, 11].

Spread of sustainable dietary patterns and tendencies towards self-sufficiency

Some population groups eat in an increasingly sustainable way. Vegetarians and flexitarians as well as a customer segment making appropriate, informed purchase decisions is on the rise. The number of people following a completely vegetarian diet went up between 2007 and 2012. The Federal Ministry of Agriculture estimates 2% vegetarians [15], and the German Vegetarian Union estimates around 7 million vegetarians (8%-9% of the entire population) [16]. Vegetarian cuisine is enjoying increasing popularity in good restaurants. From the viewpoint

of sustainability, insects are increasingly being recognised as a food source and are beginning to be established in the gourmet food scene.

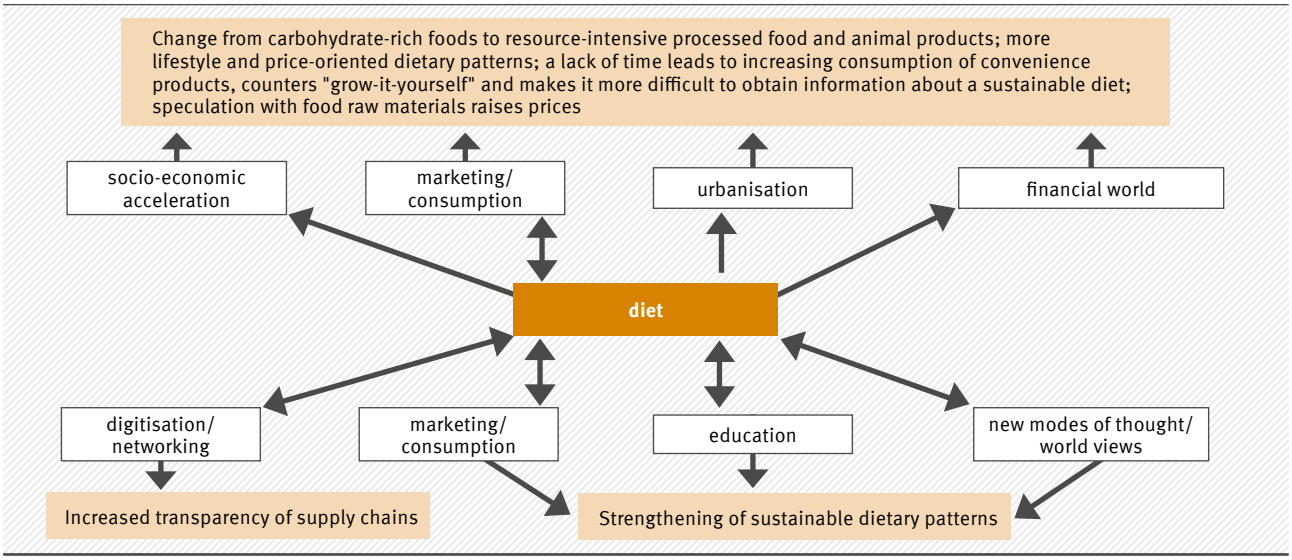
There is an emerging trend towards food marketed as regional, fresh and organic in areas where consumers are oriented towards and can afford such products. Younger people are increasingly turning their backs on frozen foods and are buying food in smaller, local supermarkets; the first packaging-free supermarkets have emerged and have been well received [18, 19]. The level of education has an influence on product selection: 58% of those with at least A-levels often buy organic products, whereas in the groups with lowest level of education only 18% purchase such products [20]. Price-conscious shopping is most common for those with a lower income and level of education [20]. A special focus is increasingly being placed on self-sufficiency in the form of permaculture, urban gardening or urban farming.[22] This trend is improving food security in certain regions and cities [14]. At an individual level, it increases one's connection to nature and can have a positive effect on the appreciation of food [11].

Possible entry points for resource policy

- Political support for urban gardening/farming as well as considering them in city planning; promotion of self-cultivation of personal land
- Education, campaigns and projects to strengthen a close connection to nature; raise awareness about food waste and inform about the effects
- Improving monitoring of food supply chains
- More funding for ecological agriculture and abolition of subsidies for unecological agriculture
- Manage demand through price, especially the inpricing of environmental impacts of meat production
- Introduction of a Veggie Day in public institutions, such as canteens and schools
- Promote seasonal and regional eating habits

21 | "QR codes are 2D codes, which can be scanned and read by mobile phones, smartphones and tablets where URLs, telephone numbers, SMS and free text can be stored." http://wirtschaftslexikon.gabler.de/Definition/qr-code.html.
22 | While urban farming also includes urban livestock breeding, urban gardening only involves plant cultivation in cities.

Links to other trend themes



Literature

[1] UNEP, 2011. The Critical Role of Global Food Consumption Patterns in Achieving Sustainable Food Systems and Food for All. A UNEP Discussion Paper.

[2] WHO, 2014. Obesity and overweight. URL http://www.who.int/mediacentre/factsheets/fs311/en/, retrieved on 24.07.2014.

[3] FAO, 2012b. The State of Food Insecurity in the World. Economic growth is necessary but not sufficient to accelerate reduction of hunger and malnutrition.

[4] Bundesministerium für Ernährung und Landwirtschaft, 2014a. Umgang mit Lebensmitteln. URL http://www.bmel.de/DE/Ernaehrung/UmgangLebensmittel/UmgangLebensmittel_node.html;jsessionid=CF36C02741A7492561A4AD7C72F10FA4.2_cid296, retrieved on 24.07.2014.

[5] Kearney, John, 2010. Food consumption trends and drivers. Philosophical transactions of the royal society B: biological sciences, 2793–2807.

[6] Heinrich-Böll-Stiftung/ BUND/ Le Monde Diplomatique, 2014. Fleischatlas 2014. Zahlen und Fakten über Tiere als Nahrungsmittel, Berlin.

[7] Wognum, P.M. (et al.), 2011. Systems for sustainability and transparency of food supply chains–Current status and challenges. Advanced Engineering Informatics 25.1, 65–76.

[8] Bruinsma, Jelle (Es.), 2003. World Agriculture: Towards 2015/2030. An FAO perspective. Earthscan, London.

[9] Godfray, H. Charles J. (et al.), 2010. The future of the global food system. Philosophical Transactions of the Royal Society B: Biological Sciences 365, 2769–2777.

[10] FAO, 2012a. World agriculture towards 2030/2050: the 2012 revision. ESA Working Paper 12-03. United Nations Food and Agriculture Organization, Rome.

[11] Persönliche Interviews im Rahmen des SimRess-Projekts, April 2014.

[12] Seven One Media, 2007. Trend Report Convenience. Machen Sie es sich bequem.

[13] Maastrich University, 2012. First-ever public tasting of lab-grown cultured beef burger. URL http://www.maastrichtuniversity.nl/web/Main/Research/ResearchUM/FirsteverPublicTastingOfLabgrownCulturedBeefBurger.htm, retrieved on 16.07.2014.

[14] SimRess Workshop.

[15] Bundesministerium für Ernährung und Landwirtschaft, 2014a. URL http://www.bmel.de/SharedDocs/Pressemitteilungen/2014/101-Zahl-der-Woche.html, retrieved on 16.07.2014.

[16] Vegetarierbund Deutschland, 2014. URL https://www.vebu.de/lifestyle/anzahl-der-vegetarierinnen, retrieved on 16.07.2014.

[17] European Vegetarian Union 2013, How many Veggies. URL http://www.euroveg.eu/lang/en/info/howmany.php, retrieved on 16.07.2014.

[18] Tanriverdi, Hakan, 2014. Start-up kämpft gegen Verpackungswahn. Süddeutsche Zeitung. URL http://www.sueddeutsche.de/wirtschaft/neuer-supermarkt-in-berlin-start-up-kaempft-gegen-verpackungswahn-1.1941824, retrieved on 16.07.2014.

[19] Uken, Marlies, 2011. Verpackungswahn: Die ersten „zero-waste“ Supermärkte. URL http://blog.zeit.de/gruenegeschaefte/2011/07/19/verpackungswahn-die-ersten-zero-waste-supermarkte/, retrieved on 16.07.2014.

[20] Bundesministerium für Ernährung und Landwirtschaft, 2014b. Einkaufs- und Ernährungsverhalten in Deutschland. TNS-Emnid-Umfrage des BMEL.

[21] LEAD (Livestock, Environment and Development Initiative), 2006. Livestocks long shadow environmental issues and options.

[22] Audsley, Eric (et al.), 2009. How low can we go? An assessment of greenhouse gas emissions from the UK food system and the scope for to reduction them by 2050. WWF-UK.

[23] Reijnders, Lucas/ Soret, Sam, 2003. Quantification of the environmental impact of different dietary protein choices, American Society for Clinical Nutrition.

[24] Statista, 2012. Statistiken und Fakten zum Thema Einkauf und Konsum von Lebensmitteln. URL http://de.statista.com/themen/1191/einkauf-und-konsum-von-lebensmitteln/, retrieved on 24.07.2014.

[25] Frankfurter Rundschau, 2013. Discounter werden deutlich teurer. URL http://www.fr-online.de/wirtschaft/aldi--lidl-und-co--discounter-werden-deutlich-teurer-,1472780,24592712.html, retrieved on 24.07.2014.

[26] Bundesvereinigung Ernährungsindustrie, 2014. Jahresbericht 2013_2014, Berlin.

[27] OR Newswire, 2013. Top-Trends 2014 bei Nahrungsmitteln und Getränken: Verschwendung vermeiden und Vertrauen zurückgewinnen. URL http://www.prnewswire.co.uk/news-releases/top-trends-2014-bei-nahrungsmitteln-und-getranken-verschwendung-vermeiden-und-vertrauen-zuruckgewinnen-231543071.html, retrieved on 24.07.2014.

[28] Der Spiegel, 2014. Verschwendung von Lebensmitteln: EU-Staaten wollen Haltbarkeitsdatum für Nudeln abschaffen. URL http://www.spiegel.de/wirtschaft/unternehmen/mindesthaltbarkeitsdatum-fuer-nudeln-kaffee-tee-reis-neuer-eu-plan-a-969939.html, retrieved on 24.07.2014.

[29] Reset, 2012. Lebensmittelverschwendung. URL http://reset.org/knowledge/g?gclid=CjwKEAjw9LKeBRDurOugs43jnlgSJACUXqHxDVfQhMZOvh0pweFL2LRXVIPnzavJ7VfHREsWkZYqgBoCvmvw_wcB, retrieved on 24.07.2014.

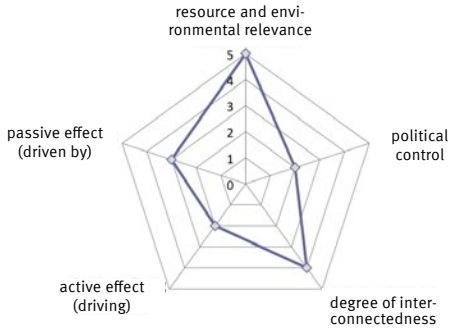
[30] Bundesministerium für Ernährung und Landwirtschaft, 2014. Zu gut für die Tonne. URL https://www.zugutfuerdietonne.de/warum-werfen-wir-lebensmittel-weg/warum-werfen-wir-so-viel-weg/, retrieved on 24.07.2014.

[31] BR, 2013. Bodensee- und Neuseelandapfel. URL http://www.br.de/radio/bayern1/inhalt/experten-tipps/umweltkommissar/umwelt-apfel-regional-neuseeland-100.html, retrieved on 24.07.2014.

Trend theme 6

New modes of thought and world views

Opposition to socially and environmentally harmful management approaches is growing – alternative, sustainable lifestyles are being led in niches. Transition initiatives are spreading - deceleration and more time are valued over consumption and status by a small but growing group of people.



Status quo

Values and world views are heavily influenced by the government and social system, i.e., pluralist democracy and a market economy. The economic driving forces of this system have made Germany a meritocracy and affluent society; high living standards and mass consumption are widespread. The transformation to a service economy reinforces performance orientation, and work gives a strong sense of identity [1]. Despite tendencies towards individualisation [2] and increased educational opportunities, opportunity remains influenced by class and/or status [3]. Starting in the 60s and 70s, some social milieus experienced a value shift from a materialist to post-materialist – that process, however, reached stagnation in the 90s [4]. Regardless of these developments, consumer spending and product quantities per capita have grown steadily since the Federal Republic of Germany was founded [5,22].

Pluralistic and heterogeneous lifestyles are being led. Society is rather secular, however, around 65% of the population belong to Christian churches. Milieus, which are usually attributed more traditional or conservative world views, are slightly in the majority over adaptive, liberal intellectual and socio ecological milieus. In the last few years, initiatives have been built in niches within the latter milieu which. These niches have formed as a reaction to acceleration tendencies and to ecological challenges, demanding a shift towards more sustainability [4].

Resource and environmental relevance of the trend theme

New, more sustainable lifestyles and changes in world views currently are mainly niche phenomena and thus at present unfold only limited environmental relevance. Around 5–10% of society is considered as being open to change [16]. The change in thinking to a less materialistic way of living holds a huge potential for reducing the consumption of resources and environmental impacts. With a decline in consumption, shift towards sufficiency and a switch to more resource-efficient mobility solutions and eating habits, material requirements could be reduced to around 8 tonnes per capita [17]. Representatives of more resource-efficient ways of living argue that, without welfare losses, allowable per capita emissions (~ 2.7 tonnes of CO_2) could be achieved worldwide [18]. Waste could be significantly reduced. Inefficient use of land for the production of animal feed and foodstuffs of animal origin would be reduced. Because of technological efficiency gains, there would also be no rebound effect [6, 19].

In motion: trends and developments

The trends described in this trend theme mainly constitute niche phenomena, emerging from a small basis, but showing increasing growth rates.

Transition initiatives are spreading

Opposition to socially and ecologically harmful management approaches is growing – in reaction to climate change, there has been a call to rethink the predominant use of fossil fuels. As a response to the industrial and consumer economy, life models inspired by sustainability and considerations of sufficiency are becoming more widespread [6]. Transition initiatives, such as the transition town movement, are growing [7]. Local self-determination and responsibility of communities is increasing, with use of new forms of participation and cooperation in civil society initiatives [8]. This leads to social innovation and systemic changes to more sustainable lifestyles.

Changing societal value of work

Flexible, meaningful jobs and independent work processes are gaining in significance - more and more people attach importance to a healthy work-life balance, a main factor in the trend towards deceleration [9] (see also trend theme "working world"). Powered by social entrepreneurs and labour forces, the economic focus is shifting from maximising profits to maximising common welfare. New business models are being developed and the sharing economy and sharing instead of owning are gaining in popularity – bartering services are also on the rise. Meanwhile, 750,000 people use a carsharing system: in 2013 alone, 300,000 people became customers of such service providers [10] (see also trend theme "(new) business models"). Handmade articles and creating your own products is being held in higher esteem. Long-lasting, quality products are being purchased, whereas short-lived mass products find fewer consumers. In niches, minimalism is also attracting more followers – under this lifestyle, consumption is greatly reduced and, except for a few carefully selected items, objects are seen as a burden [12]. The industrial sector is continuing to shrink, while the service sector grows. Scholars are increasingly coming up with models in which society manages without economic growth. These models focus on wellness as the basic need to be satisfied, with post-materialist values in the foreground [13].

More conscious eating habits are increasing in certain segments

Flexitarism and vegetarianism (and the extreme forms of veganism, fruitarianism) are increasing as a countertrend to high meat consumption. There is a growing demand for regional food. In the countryside there is an increase in self-cultivation; in cities urban gardening and permaculture are on the rise (see also trend theme "diet").

Shift in values are affected by education

The shift in values has also arrived in the education sector. New sustainable modes of thought are finding their way into schools and higher learning and are causing a long-term social change. The importance of neoliberalism in economics teaching is decreasing – instead, diversity and pluralism in economics teaching are increasing, with a focus on the economics of well-being (see also trend theme "education").

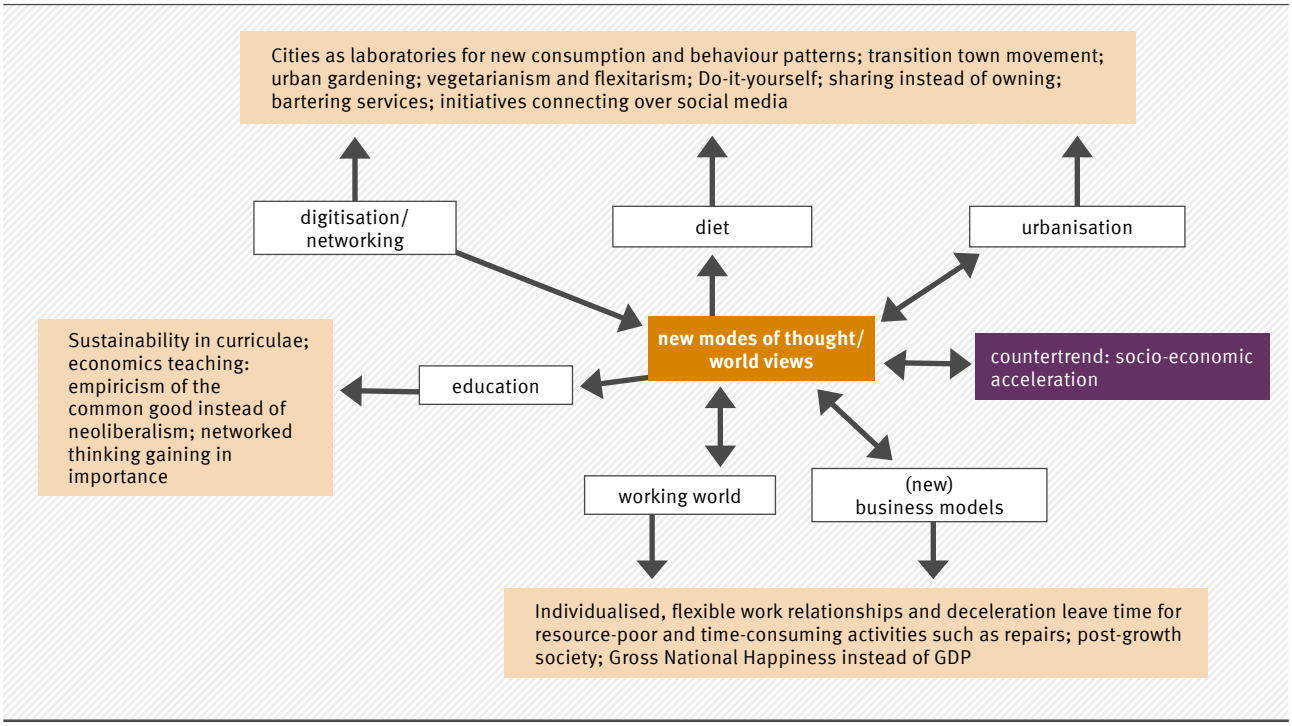
Possible entry points for resource policy

- Stronger focus on new prosperity indicators outside the Gross Domestic Product [20] – Happiness instead of GDP
- Work time reduction to reduce financial resources for (over)consumption and increase time resources for recovery and economic independence (self-production, extending product life, volunteering, exchange of goods and services) [9, 19]
- Support measures for a culture of mindfulness – as a resilient alternative for life quality beyond consumer culture [21]
- Create room for (transition) initiatives in city planning and make experiments in sustainable living possible
- Organise equal participation between governments and initiatives to create ownership [8]; foster bottom-up initiatives and participation
- Involve different stakeholders; for example, churches could utilize their infrastructure and connection to the community as forums for dialogue on post-growth topics
- Information campaign against a consumer and throwaway society
- Adjustment of the regulatory framework for ownership and use of spaces, expansion of common goods as well as the creation of a sharing economy [6]

Changing gender relations

Traditional gender roles are changing, thereby leading to societal changes. The shift to (supposed) female values – called the female shift – supports the trends mentioned in this chapter and has an effect on different areas. Reconciling work and family life, putting a greater emphasis on non-material status symbols, and meaningful occupation are more important to women than to men. Women are more represented in the labour market, but the model of typical "men's work" or "women's work" still lives on. The growth of more "feminine" human-oriented service occupations that cannot be outsourced or made ever more efficient increases resilience in the economic system and labour market. However, women are increasingly pushing their way into more male dominated fields as well as into leadership positions in business and society. In economic and financial organisations, female managers are less likely to have an affinity for taking risks and attach greater value to social and ecological principles [23]. The importance of gender and diversity is increasing for companies [14], which must offer employment compatible with a multitude of life situations and needs [24]. With increasing job shares and rising income, consumption decisions of women as independent consumers and providers for their dependants (children and care) play an increasingly important role. Women frequently display mobility and energy consumption behaviours different from those of men [25, 26, 27]. The food and health sector has also been influenced by the female shift: women ask more often for organic and regional food, buy more fruit and vegetables, and are more often vegetarians than men [15].

Links to other trend themes



Literature

[1] Geißler, Rainer, 2006. Die Sozialstruktur Deutschlands: zur gesellschaftlichen Entwicklung mit einer Bilanz zur Vereinigung, VS Verlag, Wiesbaden.

[2] Schimank, Uwe, 2012. Sozialer Wandel. In: Hradil, Stefan (Eds.): Deutsche Verhältnisse. Eine Sozialkunde, Bundeszentrale für politische Bildung, Bonn.

[3] Becker, Rolf/ Hadjar, Andreas, 2010. Das Ende von Stand und Klasse? 25 Jahre theoretische Überlegungen und empirische Betrachtungen aus der Perspektive von Lebensverläufen unterschiedlicher Kohorten. In: Berger, Peter A./ Hitzler, Ronald (Eds.): Individualisierungen. Ein Vierteljahrhundert „jenseits von Stand und Klasse", VS Verlag, Wiesbaden.

[4] Müller, Hans-Peter, 2012. Werte, Milieus und Lebensstile. In: Hradil, Stefan (Eds.): Deutsche Verhältnisse. Eine Sozialkunde, Bundeszentrale für politische Bildung, Bonn.

[5] Statistisches Bundesamt, 2013. URL httpsa://www.destatis.de/DE/ZahlenFakten/GesellschaftStaat/EinkommenKonsumLebensbedingungen/AusstattungGebrauchsguetern/Tabellen/Unterhaltungselektronik_D.html, retrieved on 25.07.2014.

[6] Schneidewind, Uwe/ Zahrnt, Angelika, 2013. Damit gutes Leben einfacher wird. Perspektiven einer Suffizienzpolitik, Oekom-Verlag, München.

[7] Transition Netzwerk, 2013. Karte aktueller Transition Initiativen & Gründungsinteressenten. URL http://www.transition-initiativen.de/page/karte-transition-inis, retrieved on 07.07.2014.

[8] Langsdorf, Susanne (et al.), 2014. Going out of the town hall: The benefits and how they can be achieved, Open Citizenship Vol 5, 1.

[9] Kopatz, Michael, 2012. Arbeit, Glück und Nachhaltigkeit. Warum kürzere Arbeitszeiten Wohlbefinden, Gesundheit, Klimaschutz und Ressourcengerechtigkeit fördern, Wuppertal Institut für Klima, Umwelt, Energie GmbH, Wuppertal.

[10] Sorge, Nils-Viktor, 2014. Autobauer verkaufen weniger Neuwagen wegen Carsharing. Manager Magazin. URL http://www.manager-magazin.de/unternehmen/autoindustrie/autobauer-und-ihre-carsharing-dienste-wie-car2go-und-drive-now-a-956018-2.html, retrieved on 07.07.2014.

[11] Paech, Niko, 2011. Vom grünen Wachstumsmythos zur Postwachstumsökonomie. In: Welzer, H./Wiegandt, K. (Eds.): Perspektiven einer nachhaltigen Entwicklung, Fischer Taschenbuch Verlag, Frankfurt.

[12] Brzoska, Maike, 2014. Wenig ist genug. Zeit Online. URL http://www.zeit.de/2014/13/minimalismus, retrieved on 07.07.2014.

[13] Jackson, Tim, 2009. Prosperity without Growth. Economics for a Finite Planet, Earthscan, London.

[14] Zukunftsinstitut, 2013. Pressemitteilung: Womanomics – die Wirtschaft wird weiblich. URL http://www.zukunftsinstitut.de/aktuelles/2013/03/28/pressemitteilung-womanomics-die-wirtschaft-wird-weiblich/, retrieved on 07.07.2014.

[15] Gesellschaft für Konsumforschung Verein, 2012. Von Jägern und Sammlern. URL http://www.gfk-compact.de/index.php?article_id=213&clang=0, retrieved on 25.07.2014.

[16] Linz, Manfred, 2013. Suffizienz – unentbehrlich für Nachhaltigkeit. In: Simonis, Ernst Udo: Mut zu Visionen. Jahrbuch Ökologie 2014, Hirzel Verlag, Stuttgart.

[17] SPREAD, 2012. European Lifestyles. The Future Issue. Final Report SPREAD Sustainable Lifestyles 2050 project.

[18] Hopkins, Rob, 2008. The Transition Handbook: From Oil Dependency to Local Resilience. Totnes, Devon.

[19] Paech, Niko, 2012. Befreiung vom Überfluss. Auf dem Weg in die Postwachstumsökonomie, Oekom Verlag, München.

[20] Diefenbacher, Hans/ Zieschank, Roland, 2011. Woran sich Wohlstand wirklich messen lässt. Alternativen zum Bruttoinlandsprodukt, Oekom Verlag, München.

[21] Ericson, Torgeir (et al.), 2014. Mindfulness and sustainability, Ecological Economics 104.

[22] Uchatius, Wolfgang, 2013. Wachstumskritik. Jan Müller hat genug. DIE ZEIT N° 10/2013.

[23] Röhr, Ulrike, 2013. FrauenUnternehmen Green Economy. Life e.V./WeiberWirtschaft eG.

[24] Wall (et al.), 2013. Räumliche Mobilität und Familienleben: Generationenvergleich aus der Lebenslaufperspektive. In: Comparative Population Studies – Zeitschrift für Bevölkerungswissenschaft, 38(2), 371–404.

[25] Statistik Austria, 2013. Umweltbedingungen, Umweltverhalten. Ergebnisse des Mikrozensus 2011, Wien, S. 111–112 (genderspezifische Auswertungen). URL http://www.statistik.at/web_de/dynamic/services/publikationen/15/publdetail?id=15&listid=15&detail=651, retrieved on 11.08.2014.

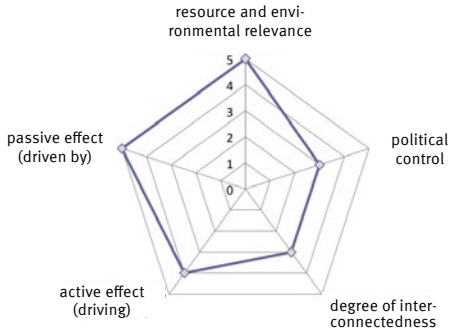
[26] Scheiner/Holz-Rau, 2012. Gendered travel mode choice: a focus on car deficient households, in: Journal of Transport Geography 24, 250–261.

[27] Hanson, 2010. Gender and mobility: new approaches for informing sustainability. In: Gender, Place and Culture, 17(1), 5–23.

Trend theme 7

(New) business models

There is an increase in the number and importance of profit-oriented multinational corporations. Online business is growing; more and more purchases are being made online and from mobile devices. Companies are increasingly adopting social commerce to improve their customer relationship by using social media. Consumers increasingly use online tools with background information about products and services which support sustainable business models.



Status quo

Multi-national corporations (MNCs) with a maximum profit-oriented business model have established themselves in the context of globalisation in both industrial nations and emerging economies[23] as a new category of economic and political actors. They are outside of national jurisdictions and, therefore, gain political power in shaping relationships in political, work, social and human-nature contexts in the countries of their field of activity [2].

In the last few years, online business has gained market share, particularly in Information and Communications Technologies (ICT), clothing and foodstuffs. Due to digitisation, more information about the products and processes is available and their sustainability performance is therefore more transparent which has led to an increase in demand for more sustainable and resource-efficient products and services. While at the EU level every fourth citizen demands such products, in Germany it is every third [2]. In addition to online business, product-service systems (such as printer leasing services) and approaches of a sharing economy or collaborative economy, e.g., carsharing, create an alternative to status-driven product ownership.

Resource and environmental relevance of the trend theme

In the past, the activities of MNCs often took place with no regard for environmental and social standards and, in many cases, led to severe environmental damage, expulsion and health impairments which resulted in the death of those affected in the most extreme cases [20]. Although a change in their understanding of environmental management has been observed in many MNCs over the past few years which minimises negative social, environmental and business activities and helps implement development changes for the local population [21], the effect MNCs have on the consumption of resources continues to be regarded critically [9].

Growth in online business requires increasing energy use for online transactions and leads to an increase in the use of packaging materials for products and shipping. However, with well-coordinated logistics, it also reduces transport requirements compared to the transport of the customer to the goods and back which mainly is done with individual mobility structures. Therefore, when the transport distance for online shipping is up to 50% farther than for the physical transaction, the CO_2 emissions connected to transport are less with online transactions and shipping of (used) clothing than going to flea markets, second hand shops or buying and collecting items from the classifieds [17].

Continue on the next page →

23 | In June 2012 three of the ten biggest MNCs came from China.

In motion: trends and developments

Spread of growth and maximum profit-oriented business models

According to projections, global economic output will continue to increase over the coming decades. In Asia in particular (China, India, etc.), an aggressive growth policy determines the political agenda. Increasing internationalised goods and cash flows, the global spread of Western lifestyles and ever shorter product life cycles reinforce a maximum profit-oriented business model which strives for continuous growth [3, 4] (also see trend theme "socio-economic acceleration"). This is particularly evident in the increase in size and number of MNCs. From the end of the 1960s to 2008, the number of MNC went up from around 10,000 to over 80,000. During this time,there was a simultaneous decrease in economically developed countries where the number of MNCs fell from over 90% to just over 70% [5]. MNCs often pursue profit maximisation and high profit margins as the ultimate goal and also appear aggressive with their political interference, e.g., through using tax advantages in various host countries and the potential threat of relocation to receive better framework conditions. In this way they also limit market options for local and smaller companies [6, 7, 8, 9, 10, 11].

→
The strengthening of the sharing economy through greater use of functions rather than product ownership lessens resource requirements and reduces environmental impacts. On the one hand, less new or additional products need to be manufactured. On the other hand, products are used longer or, rather, more intensively which is more likely to reduce unnecessary product use since the product is not always present in the household [17]. With the example of a petrol-powered scarifier, multiple use by means of leasing has a reduction potential of more than 80% of production-related substances when compared to single use [17]. For a carsharing concept in Austria, where the Austrian Federal Railways (ÖBB) made carsharing up to the nearest railway station possible for commuters and also organised day use for the carsharing automobiles parked at the station, a CO_2 emissions reduction potential of 3,5 t CO_{2eq} per year and car was determined [22].

Increasing establishment of convenience supermarkets

The increasing work time squeeze and diminishing amount of time available result in more and more convenience supermarkets being established, especially in city centres. These supermarkets rely on shoppers returning daily and put an emphasis on a small selection, largely ready-made meals and products that require little preparation [12] (also see trend theme "diet").

Increase of e-commerce and mobile commerce

Consumers have increasingly shifted their shopping habits to the Internet, particularly for ICT products, but also more and more for fashion. E-commerce is flourishing and creates an increasing number of online shops [12, 13] (see also trend theme "digitisation and networking"). The share of online business in total sales rose from 4.9% in 2007 to 16.8% in 2012 in the areas of fashion and accessories and 8% to 17% in consumer electronics and electronic equipment [14]. At the same time, the market share for purely offline business models has gone down; on the one hand, retail sales at peripheral locations are decreasing but, on the other hand, integrated concepts of event shopping experiences and showroom stores (so-called multi-channel concepts) are gaining in importance for online business [12].

The growth of mobile commerce (mobile shopping over tablets, smartphones, etc.) has led to the development of anywhere commerce, i.e., shopping possibilities from any place at any time [12, 13]. Online business and mobile commerce lower the purchasing threshold due to lower interaction costs, nearly inexhaustible selection, quick and easy payment as well as fast shipping times. Purchasing decisions are made more easily and quickly; purchased products can also easily be returned with a complaint when the effort and cost of the claim does not exceed the cost of the item [13]. However, consumers are less prone to impulse buys when shopping online on their PC at home; the desired products are purposely sought, using a lot of available information to weigh the best alternatives [15].

Greater business use of social media for marketing purposes

The possibilities – arising from digitisation – to trace and record individual consumer behaviour[24] have made more personalised adverting possible and, in this way, encourage customers to purchase always newer, better-tailored products [12] (also see trend theme "marketing/consumption"). This also includes the increasing use of social media in many companies which is used to earn customer loyalty to reach new customers and penetrate directly into the lives of customers [12].

Increasing availability of information raises demand for sustainable products

Due to digitisation, consumers have more and more information available about the sustainability performance of product and service offers and providers. The information is increasingly used in order to make positive and negative examples known over social media and to assess them publicly. QR codes and Apps are increasingly being used by consumers to monitor possibilities, leading to improved transparency, for example, with food products whose origin and processing is traceable [12] (also see trend theme "diet"). At the same time, suppliers and company business partners also demand more sustainable business along supply chains [12]. On the one hand, this means a rise in the purchase of more sustainable products, e.g., Fairphone. On the other hand, there is also an increase of ecolabels which results in growing confusion and makes it difficult to tell the difference between reliable and greenwashing cases [16].

Emergence of more alternative and sustainable business models

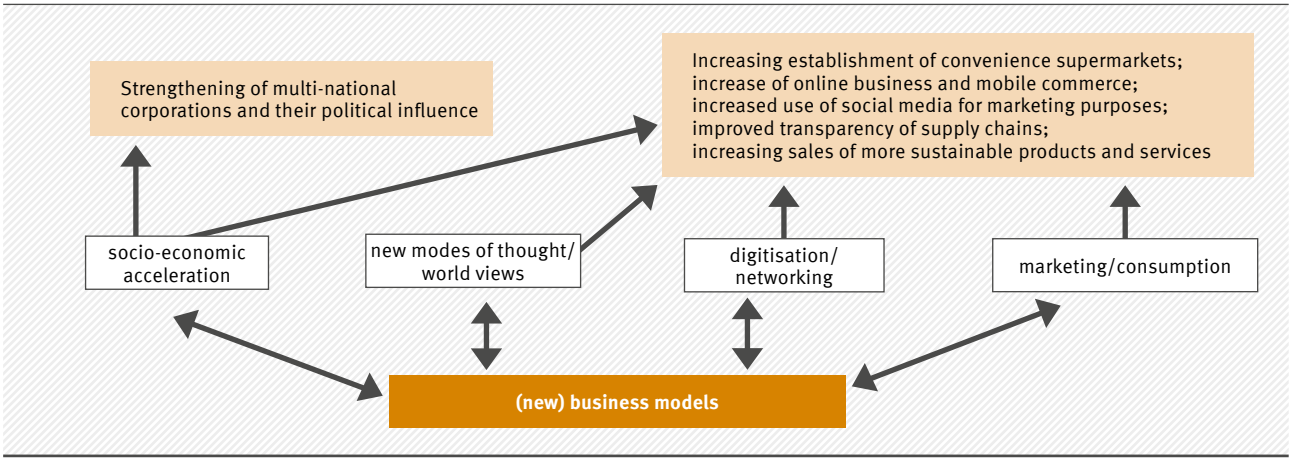
Increasingly visible environmental damage and social inequalities have led to more criticism of the Western economic growth model. Opposing mental models and lifestyles are increasingly creating alternative business models. This includes business models with a focus on self-marketing and handmade (e.g. bloggers, Dawanda sellers). More sustainable business models are also on the rise. Thus, high quality and environmentally friendly as well as fair trade products and services are increasingly emerging, e.g., packaging-free supermarkets. The sharing economy, where products are used in place of ownership, is gaining in importance and is becoming widespread in various sectors, e.g., carsharing, leasing floor covering[25], lighting systems[26] or tools [17]. In parts of the population, sharing and trading for certain services and products has replaced the formal market. According to a representative survey conducted by BITKOM with 1,000 people in Germany from 14 and up, it appears that 9% use bike sharing, 3% carsharing, and 2% privately provided accommodation (couchsurfing) [18]. 17% (drawn from an extrapolation of 9 million people in Germany) stated that they have also occasionally shared cars, tools or their apartment with the help of the Internet [18]. In addition, other social innovations of sustainable consumption are emerging such as Do-it-Together, collaborative consumption in which several people with similar goals are part of a particular collective. This includes, for example, energy neighbourhoods or cooperative building projects and presuming in which mutually designed products and services improve consumption possibilities, e.g., a citizens' bus designed by the citizens themselves and its timetable. Do-it-Yourself is an example of competence-expanding consumption where products are made by hand or can be reused, e.g. sewing cafes and self-repair workshops [19].

24 | For example, with interactive television television, which particular shows ads according to the viewer, and uses algorithm based analysis of purchasing decisions.
25 | E.g. the provider Desso, http://www.desso.com/, or Interface, http://www.interfaceglobal.com/.
26 | E.g. Philips, http://www.lighting.philips.com/main/services/lightinglifecycleservices.wpd.

Possible entry points for resource policy

- Implement obligatory sustainability reporting for MNCs and smaller companies
- Promote more trustworthy ecolabels and/or criteria that a company must fulfill for ecolabels
- Foster concepts for a collaborative economy
- Foster supportive framework conditions for alternative business models, such as, product service systems

Links to other trend themes



Literature

[1] Nölke, A., 2013. Der Aufstieg multinationaler Unternehmen aus Schwellenländern. Staatskapitalismus in besonderer Form. der moderne staat, 6. Jg, Heft 1, S. 49–63.

[2] BPB, 2013. Transnationale Unternehmen: Problemverursacher und Lösungspartner? URL http://www.bpb.de/apuz/175496/transnationale-unternehmen-problemverursacher-und-loesungspartner?p=all, retrieved on 07.07.2014.

[3] IW Köln, 2013. Grüne Produkte sind gefragt. URL http://www.iwkoeln.de/de/infodienste/iwd/archiv/beitrag/nachhaltiger-konsum-gruene-produkte-sind-gefragt-120512, retrieved on 01.07.2014.

[4] Streeck, W., 2011. Taking Capitalism Seriously: Toward an Institutionalist Approach to Contemporary Political Economy. Max-Planck-Institut für Gesellschaftsforschung Discussion Paper 10/15.

[5] Welzer, H., 2011. Mentale Infrastrukturen. Wie das Wachstum in die Welt und in die Seelen kam. Berlin: Heinrich-Böll Stiftung. Schriften zur Ökologie 14.

[6] BPB (Bundeszentrale für politische Bildung), 2010. Globalisierung - Zahlen und Fakten: Transnationale Unternehmen.

[7] EEA, 2011. Global governance — the rise of non-state actors. A background report for the SOER 2010 assessment of global megatrends. EEA Technical report No 4/2011.

[8] Enquete-Kommission „Wachstum, Wohlstand, Lebensqualität – Wege zu nachhaltigem Wirtschaften und gesellschaftlichem Fortschritt in der Sozialen Marktwirtschaft“, 2013. Schlussbericht. Deutscher Bundestag, 17. Wahlperiode, Drucksache 17/13300.

[9] Nyamache, T./Nyambura, R., 2013. Globalization, Development and Multi-National Corporations (MNCs): The Kenyan Scenario. Research Journal of Finance and Accounting 4, 38–42.

[10] Schmidt-Bleek, F., 2014. Grüne Lügen: Nichts für die Umwelt, alles fürs Geschäft – wie Politik und Wirtschaft die Welt zugrunde richten. Ludwig Verlag, München.

[11] SRU, 2012. Umweltgutachten 2012. Verantwortung in einer begrenzten Welt. Juni 2012, Berlin.

[12] Sukhdev, P., 2012. Corporation 2020. Warum wir Wirtschaft neu denken müssen. Oekom Verlag, München.

[13] KPMG, 2012. Consumer Markets. Trends im Handel 2020.

[14] BITKOM, 2013. Trends im E-Commerce. Konsumverhalten beim Online-Shopping. Berlin.

[15] IFH Köln, 2013. Branchenreport Online-Handel. Köln.

[16] Brühl, J., 2013. Debatte zur Digitalisierung Das neue horizontale Gewerbe. URL http://www.sueddeutsche.de/wirtschaft/debatte-zur-digitalisierung-das-neue-horizontale-gewerbe-1.1785814, retrieved on 17.07.2014.

[17] IÖW, 2012. Umweltfreundlich beschaffen, aber wie? IÖW recherchiert über 300 Umweltkennzeichen und Leitfäden – Datenbank jetzt beim Umweltbundesamt online. URL http://www.ioew.de/news/article/umweltfreundlich-beschaffen-aber-wie-ioew-recherchiert-ueber-300-umweltkennzeichen-und-leitfaeden/, retrieved on 07.07.2014.

[18] Leismann, K./Schmitt, M. /Rohn H./Baedeker C., 2012. Nutzen statt Besitzen. Auf dem Weg zu einer ressourcenschonenden Konsumkultur. Heinrich-Böll-Stiftung Schriften zur Ökologie, Band 27.

[19] BITKOM, 2013. Shareconomy – Das Internet schafft eine Kultur des Teilens. URL http://www.bitkom.org/de/markt_statistik/64018_75237.aspx, retrieved on 07.07.2014.

[20] Rückert-John, Jana (et al.), 2013. Soziale Innovationen für Nachhaltigen Konsum. Kriterien zur Analyse und Systematisierung. ISInova Beiträge zur Sozialinnovation Nr. 11.

[21] Shah, A. 2002. Corporations and the Environment. Global Issues. 25 May. 2002. URL http://www.globalissues.org/article/55/corporations-and-the-environment, retrieved on 01.07.2014.

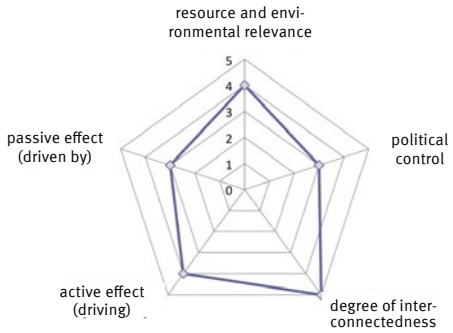
[22] Rondinelli, D.A., 2004. Creating a Vision for Environmental Responsibility in Multinational Corporations: Executive Leadership and Organizational Change. Journal of International Business Education 1: 5–22.

[23] Steininger, K.W./Bachner, G., 2014. Extending car-sharing to serve commuters: An implementation in Austria. Ecological Economics 101, 64–66.

Trend theme 8

Financial world

Global financial flows are increasing. Commodity markets are important targets for institutional investors. Price volatility and risks of bubbles in financial markets are increasing. The first smaller reforms in the area of finance occur after the financial crisis in which international cooperation is of crucial importance.



Status quo

Capital for production and investment processes is provided through the financial sector. In the past few years, however, the financial and real economy have clearly become decoupled. From 1994–2007, the growth from international capital flows already accounted for three times the world trade growth [2]. While the Gross National Product increased five-fold between 1980 and 2007, fixed assets worldwide went up 16-fold [3]. The financial sector provides better information to investors about existing investment opportunities and transforms financial volumes and risks by distributing them to different investors at different rates [1]. By doing so, the financial sector encourages the accumulation of capital in the real economy, e.g., by investing in machines, equipment or the business establishment. Last but not least, with the deregulation of the financial sector and the spread of cash-generating potential, the finance markets have been globalised and the financial flows have developed faster than nominal economic performance [1].

Globalised financial markets create an increased use of natural resources through investment in commodities and energy companies as well as through expansion of raw material trade markets [1]. In the last few years, excessive speculation with agricultural commodities has contributed to highly volatile food prices. In some countries, this resulted in civil unrest and worsening famine [4]. The fact that the financial system sets incentives for short-term profit maximisation rather than sustainable business has been widely criticised [30, 31].

The global economy has slowly recovered in the years following the global financial crisis, supported by rising investments and increasing trade [5]. In the fall of 2008, the G20 agreed on a reform agenda for the financial system which included, among other things, a salary limit for managers, closer monitoring of derivatives and securitisation, higher reserve requirements for financial institutions and a reform of prudential supervision. Further crises are possible, as the reforms have been carried out selectively and certain factors of future crises have not yet been recognised [6]. Due to globalisation and the close interconnection of financial markets, contagion and domino effects across world regions, as well as the global economy are possible [7].

Resource and environmental relevance of the trend theme

Countries across the globe reacted to the financial crisis with stimulus packages. The amount provided for green technologies varied considerably. South Korea invested 95%, China around a third and Germany 13.2% of its aid package in green technologies. In the event of a crisis, future assistance measures should allocate a more significant amount to more environmentally friendly technologies in order to use the dominance of (financial) economic themes on the political agenda for a strengthening of investments in sustainability [26].

By means of state intervention in the financial market, the risk of new crises and effects of deregulated speculations are reduced. The limitation of excessive speculation with commodities for food production minimised extreme price fluctuations. The political and economic situation of emerging and developing nations is thus stabilised, freeing up opportunities for environmental matters. In the reforms of the past few years, the connection between financial market regulation and environmental risks was hardly taken into account [27].

Environmental risks, which are linked to investments in fossil energy, have still not been disclosed. This makes it more difficult for investors to make informed decisions about investments into green technologies [28]. Investments in fossil fuels continue to rise and increase the potential of a carbon bubble.

The increasing interconnection between commodity and financial markets leads to more investments being made in capital-intensive materials extraction, thus accelerating raw material extraction. On the other hand, by exploiting minimal price differences (arbitrage) or speculation (trading), investor actions in commodity markets increase the risk of bubbles in the short-term and price volatility [1]. The increasing role of investment decisions in the direction of resource efficiency have played only a minor role in the financial sector up until now, both with regard to the topics and technologies invested in as well as the major decision-making in the finance industry for financing and rating companies – the so-called key performance indicators [29].

In motion: trends and developments

Strengthening link between commodity and financial markets

Due to investment decisions made by institutional investors to invest in the raw materials market, commodity and financial markets are increasingly linked (also see trend theme “resource governance”). Investments in the raw material markets rose from EUR 13 billion to EUR 170–205 billion between 2003 and 2008 [8]. After a drop in investments due to the financial crisis, investments in 2010 doubled once more compared to 2008 [1].

Creation of a carbon bubble

Energy companies draw parts of their enterprise’s value from the reserves of raw materials they have at their disposal and from new reserves which they develop. In 2012, 200 of the largest companies in the energy branch invested 674 billion US dollars in the development of new reserves, 126 billion US dollars of which flowed back to the shareholders [9]. In order to respect the two-degree climate target, only a fifth of the known fossil fuel reserves can be consumed by 2050 [10]. To adhere to or, in certain cases, implement international climate targets, fossil fuel deposits which have already been secured by energy companies for future energy supply lose value, creating a carbon bubble. Investments which investors have made in energy companies up to this point are lost. Because banks, insurance companies, pension funds and other social actors are among the investors, the loss of capital affects large portions of the population whose assets would be destroyed when the bubble bursts [11, 12].

Increased food speculation

Speculation in agricultural commodities keeps occurring and leads to extreme price fluctuations. In Ethiopia, the price of corn rose 141% between 2007 and 2008. In the 2008 crisis, the average global food price rose by 51% [13]. People in developing nations whose access to food is affected and endangered by the rising prices of certain raw materials are more often victims of excessive speculation and price jumps [14, 15]. While the number of undernourished people at a global level went down from just over 1 billion in 1990–1992 to 842 million in 2011–2013, the number in Africa and Western Asia rose from 186 to 247 million people during the same period – the development of food prices plays an important role here [15]. Rising food prices also reduce the financial means available to people in developing nations for education and health [16]. Due to price jumps, the governments of developing nations which import food have less state funds available for social security programmes. Agricultural development has been hindered by programmes which protect against price risks and the economic development in emerging and developing nations has been slowed down over the long term [17]. In order to ensure the food security of their population, financially strong emerging nations use land grabbing tactics as a reaction to price developments. This makes access to land and water more difficult for the population of the target country which increases food poverty [18].

Continued disregard of political control of financial markets

The potential risk of banks seen as "too big to fail" and hedge funds and their role in the crisis has not been fully appreciated by governments [19, 20]. Hedge funds are opaque and highly leveraged. Risks to other financial institutions, such as commercial and investment banks as well as insurance companies, are transferred by spillover effects. At the outbreak of a crisis, hedge funds quickly sell their securities, causing respective investment sectors, such as the real estate and stock markets, to lose value. As hedge fund creditors or competitors, banks are affected by this loss of value [19]. This leads to renewed bubbles in the stock, commodity and real estate markets and drives the international economy into a new crisis. If systematically important banks go bankrupt, this often leads to a cascade of further insolvencies so that such banks must protect themselves against insolvency either with specifically tailored regulations or significant government funds and, thus, taxpayer money [21]. Due to an unclear definition of systematically important banks and the related disagreement over use and risks of such regulations, political regulation has so far been neglected [21].

International coordination to prevent new financial crises

A coordination framework for information exchange and cooperation between countries is being built at an international level. This leads to efficient, multilateral crisis management where the probability of occurrence and impact of financial crises are reduced. The establishment of early warning systems helps recognise crises early on and provides clear, preventative policy options to policy makers. The financial sector is reformed and regulated: financial products will be better supervised and the financial sector as such will be made smaller [22].

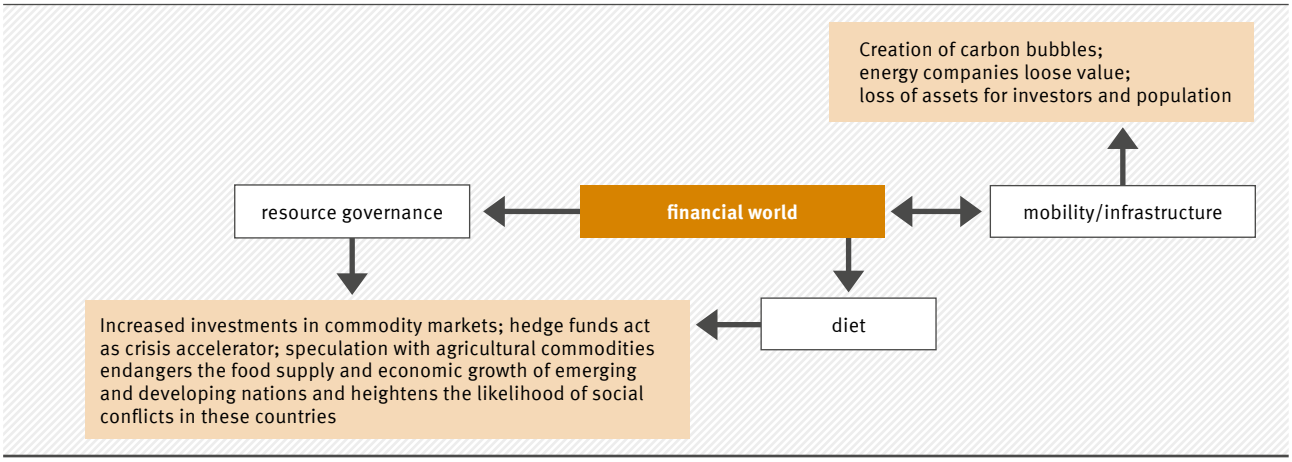
Emergence of public interest capitalism

The prevailing conception of capitalism is changing from short-term maximisation of profits to a long-term public interest orientation. Companies with a "benefit corporation" form no longer pursue profit maximisation of shareholders as their main objective but, rather, create social and environmentally friendly work and production conditions [23]. Crowdfunding is growing as a financial instrument and will presumably be legally regulated in the future [24]. The capital accumulated rose from just over a half million EUR in 2011 to 4.1 million in the first half of 2014 [25]. The more profit-oriented crowdinvesting is also growing: the amount of crowdinvesting rose from EUR 4.3 to 15 million from 2012 to 2013. Despite the high rate of increase, crowdinvesting remains a niche phenomenon for the time being; in 2013 the crowdinvesting share amounted to 0.017% of external sources of financing in Germany [24].

Possible entry points for resource policy

- Regulation of the financial sector at an international level – due to globalised financial flows, a purely national policy has no chance of success
- Integrate environmental risks into regulations for the financial economy
- Introduce a low tax rate on international financial market transactions
- Limit excessive speculation with food through a reform of the legal frameworks
- Political support by promoting longer investment periods and preferential tax treatment of investors with longer investment periods
- Government funding of investment in areas and future technologies which replace fossil fuels
- Establish resource efficiency-based key performance indicators in the financial economy

Links to other trend themes



Literature

[1] Enquete-Kommission „Wachstum, Wohlstand, Lebensqualität – Wege zu nachhaltigem Wirtschaften und gesellschaftlichem Fortschritt in der Sozialen Marktwirtschaft“, 2013. Schlussbericht. Deutscher Bundestag, 17. Wahlperiode, Drucksache 17/13300.

[2] OECD, 2011. OECD-Wirtschaftsausblick, Vol. 2011/1. OECD-Publishing.

[3] Luft, Christa, 2010. Verselbständigung der Finanz- gegenüber der Realwirtschaft – Überakkumulation als Krisenquelle. Sitzungsberichte der Leibniz-Sozietät der Wissenschaften zu Berlin. 107(2010), 37–54.

[4] SOMIO, Financing Food. Financialisation and Financial Actors in Agriculture Commodity Markets, Amsterdam 2010.

[5] OECD, 2014. OECD Wirtschaftsausblick, Vol. 2014/1, Paris 2014.

[6] Schuberth, Helene, 2013. Finanzmarktregulierung in der Europäischen Union – Fünf Jahre nach Lehman, Wirtschaft und Gesellschaft 39, 509–543.

[7] Köhler, Christina/ Weber, Mathias, 2012. Die Finanz- und Wirtschaftskrise. Ursachen, Folgen, Interventionen, in: Quiring, Oliver/ Kepplinger, Hans Mathias/ Weber, Mathias/ Geiß Stefan, Lehman Brothers und die Folgen: Berichterstattung zu wirtschaftlichen Interventionen des Staates, Wiesbaden.

[8] European Commission, 2011. Tackling the challenges in commodity markets and on raw materials. COM(2011) 25 final.

[9] The Economist, 2013. Unburnable Fuel. URL http://www.economist.com/news/business/21577097-either-governments-are-not-serious-about-climate-change-or-fossil-fuel-firms-are, retrieved on 10.07.2014.

[10] Carbon Tracker, 2012. Unburnable Carbon. Are the world’s financial markets carrying a carbon bubble? London.

[11] Rohrbeck, Felix, 2014. Bohren bis die Blase platzt, Zeit Online.

[12] Nature Climate Change, 2014. Carbon bubble toil and trouble. Nature Climate Change. 4, 229.

[13] Hauenstein Swan, Samuel/ Hadley, Swan/ Cichon, Bernardette, 2010. Crisis Behind Closed Doors: Global Food Crisis and Local Hunger. Journal of Agrarian Change 10, 107–118.

[14] M. Lagi/Yavni Bar-Yam/K.Z. Bertrand/Yaneer Bar-Yam, UPDATE February 2012 — The Food Crises: Predictive validation of a quantitative model of food prices including speculators and ethanol conversion. arXiv:1203.1313, March 6, 2012.

[15] FAO, IFAD and WFP, 2013. The State of Food Insecurity in the World 2013. The multiple dimensions of food security. Rome, FAO.

[16] Braun, Joachim von/ Tadesse, Getaw, Global Food Price Volatility and Spikes: An Overview of Costs, Causes and Solutions, Bonn 2012.

[17] Areal, Francisco J./ Balcombe, Kelvin G./ Rapsomanikis, George, 2014. Testing for bubbles in agricultural commodity markets, Rome.

[18] Robertson, Beth/Pinstrup-Andersen, Per, 2010. Global land acquisition: neo-colonialism or development opportunity, Food Security 2, 271–283.

[19] Gropp, Reint, 2014. How Important Are Hedge Funds in a Crisis? Policy Letter No. 23. SAFE (Sustainable Architecture for Finance in Europe) Policy Center.

[20] Lysandrou, Photis, 2011. The primacy of hedge funds in the subprime crisis. Journal of Post Keynesian Economics 34, 225–253.

[21] Kaufmann, G.G., 2013. Too big to fail in banking: What does it mean? SPECIAL PAPER 222, LSE FINANCIAL MARKETS GROUP SPECIAL PAPER SERIES, June 2013.

[22] Tienhaara, Kyla, 2014. Varieties of green capitalism: economy and environment in the wake of the global financial crisis, Environmental Politics 23, 187–204.

[23] Adler, Paul S., 2014. Capitalism in Question. Journal of Management Inquiry 23, 206–209.

[24] The Wall Street Journal, 2014. Wird Crowdinvesting jetzt erwachsen? URL http://www.wsj.de/article/SB10001424052702304434104579380573666514780.html, retrieved on 26.07.2014.

[25] Für-Gründer.de, 2014. Crowdfunding-Monitor: Daten, Zahlen und Fakten zum Markt. URL http://www.fuer-gruender.de/kapital/eigenkapital/crowd-funding/monitor/, retrieved on 26.07.2014.

[26] Geels, Frank, 2013. The impact of the financial-economic crisis on sustainability transitions: Financial Investment, governance and public discourse, Manchester.

[27] Helleiner, Eric/Thistlethwaite, Jason, 2009. The Greening of International Financial Regulation. In: Clapp, Jennifer, Environmental Sustainability and the Financial Crisis: Linkages and Policy Recommendations.

[28] Helleiner, Eric, 2011. Introduction: The Greening of Global Financial Markets?, Global Environmental Politics, 11, S. 51–53.

[29] Kristof, Kora/Hennicke, Peter, 2010. Kernstrategien einer erfolgreichen Ressourcenpolitik und die zu ihrer forcierten Umsetzung vorgeschlagenen Instrumente: Zusammenfassung der Ergebnisse des Arbeitspakets 7 "Politikempfehlungen und Policy Papers" des Projekts "Materialeffizienz und Ressourcenschonung" (MaRess).

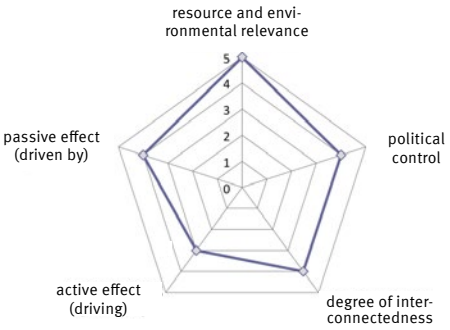
[30] Frankfurter Allgemeine Zeitung, 2009. „Es gibt eine Alternative zur Gewinnmaximierung“, URL http://www.faz.net/aktuell/wirtschaft/wirtschaftswissen/wirtschaftsethik-es-gibt-eine-alternative-zur-gewinnmaximierung-1828834.html, retrieved on 26.07.2014.

[31] Zeit Online, 2012. Deutsche-Bank-Chef Fitschen beklagt Exzesse im Finanzsektor. URL http://www.zeit.de/wirtschaft/2012-11/fitschen-deutsche-bank, retrieved on 26.07.2014.

Trend theme 9

Mobility/infrastructure

Mobility is a key issue with regards to the use of resources. In the long-term, electromobility will become the predominant mobility concept. In industrial nations, such change will take place sooner but more slowly than in aspiring emerging countries. Intermodal mobility and carsharing create a high need for adjustment in urban infrastructure but reduce the significance of cars as a means of transport.



Status quo

Individual mobility by means of cars with internal combustion engines is the dominating mobility concept both globally and nationally. At EUR 3.07 trillion, expenditures for motorised individual transport make up nearly 50% of the globally mobility market for the transport of people and goods, which amounted to EUR 6.4 trillion in 2010 or around 1,000 EUR per person [1]. Between 2000 and 2010, the global automobile market grew by a yearly average of 2%, largely driven by the yearly increase of 24% in China. In North America, Europe and Japan, a yearly decrease of 0.4% was recorded [1]. In 2010, there were roughly 1 billion cars worldwide, most registered in North America, Europe and Asia [2].

In Germany, there are 43.9 million passenger cars currently registered – of these, around 30 million are with petrol motors, 13 million with diesel motors, 0.5 million gas-powered vehicles and at least 85,575 hybrid and 12,156 electric vehicles [3, 4, 34, 35]. Although the registration of new vehicles with alternative drive systems (natural and liquefied petroleum gas, hybrid and electric) is increasing sharply, in 2014, however, it made up only a little over 1.6% of car ownership [35]. The number of new passenger car registrations in Germany has seen a slight decrease in the past few years, from around 3.3 million in 2005 to 2.95 million in 2013 [3, 5]. With a little over 60%, small cars, compact class and mid-size cars together have the largest share of passenger car sales. However, in the years 2009 to 2012, these three categories lost shares of sales to all-terrain vehicles (including SUVs, increase of share sales from around 7 to over 17%) as well as mini and high capacity vans (increase in share sales from around 9 to over 12%) [3,4]. New car registrations in the all-terrain vehicle category (including SUVs) went up from over 150,000 in 2003 to more than 460,000 in 2102 [4].

Carsharing has established itself in many cities (e.g. Car2go from Daimler, drivenow! from BMW & Sixt) and is used by 2.5% of the urban population [1]. While carsharing providers registered almost 50,000 drivers in 1997, the number was around 500,000 in 2013. During this same time period, the carsharing car fleet grew from around 500 to just under 11,000 vehicles [6].

Resource and environmental relevance of the trend theme

Despite improved individual efficiency in vehicle fuel consumption, the global increase in the number of passenger car sales and the tendency towards a second or third vehicle in emerging economies coupled with more kilometres driven, mean that the gain in fuel efficiency is comparatively insignificant in terms of total resource consumption (rebound effects) [28, 29]. To expand transport infrastructure, high amounts of resources are needed for construction and transport technology.

Compared to 2011, the average CO_2 emission for newly registered passenger cars went down to 141.8 g/km in 2012, a decrease of around 5 g [4]. To meet the 2°C goal of the United Nations and the EU, the CO_2 emissions per km drive must go down to 20 g CO_2/km by 2050 – this goes well beyond the fleet limit value of the CO_2 passenger car directive (130 g/km in 2015 and 95 g/km in 2020). In particular, this calls for an increase in cars using alternative drive systems, internal combustion engine cars cannot reach such low emission values [3, 7]. However, a positive greenhouse gas balance of electric cars depends largely on the production of the batteries and the share of electricity from renewable energies which could be used to recharge the batteries. It is only with a significantly higher share of renewable energies in the electricity mix that the CO_2 emissions emitted per km by electric cars (around 70 g CO_2 equivalents per km) – vis-à-vis petrol powered vehicles (around 200 g CO_2 equivalents per km) and diesel powered vehicles (around 170 g CO_2 equivalents per km) – could be significantly reduced [7]. However, the vehicle manufacturing for electric cars compared to cars with an internal combustion motor is around 20 g CO_2 equivalents per km higher, largely due to battery production [3, 7].

Compared to car ownership, carsharing enables environmental relief due to more intensive use and reduced mileage per person as a result of fewer journeys [31, 32] (also see trend topic "(new) business models". Because carsharing customers increasingly sell their cars (24.4% of those asked by the Federal Association of Carsharing in 2012), less km per person are driven. Furthermore curbside area is freed from parked cars and freed up for urban planning activities [6]. In the USA it was determined that, by 2020, increasing carsharing use will result in 1.7 million fewer new cars being sold; the expectation is that every carsharing vehicle on the road will replace 32 new vehicles [33].

Due to improved vehicle design and the use of ultra-strong steel, the average vehicle weight could be reduced from 20 to 25% by 2030 and, therefore, save 35 million tonnes of steel [9].

The increase of passenger numbers in air traffic is accompanied by a rise in CO_2 emissions – between 800 to 2,300 megatonnes CO_2 are expected [30].

In motion: trends and developments

Electromobility dominates long-term mobility development

In the area of individual mobility, electromobility has emerged as the number one mobility concept, both internationally as well as in Germany. Creating and sustaining electromobility and its respective infrastructure –the interface between the power grid and vehicle is especially important for electric cars – is politically endorsed and strongly supported. Development is primarily taking place in industrial nations and industrialising countries like BRICS. In 2012, 38% of the global electric car stock – around 180,000 – was in the USA, 24% in Japan, 11 % in the EU and 6% in China [7, 8]. This also means an increasing demand of necessary raw materials, such as rare earths for electric car batteries, electric mobility and respective infrastructures [9].

The prices for electric vehicle batteries will continue to drop – from around EUR 800 /kWh in 2011 to less than EUR 300 /kWh in 2020 [3, 8]. The overall purchase price for electric vehicles is therefore expected to decrease. The rising fuel prices, increased battery range as well as improved efficiency (kWh/100 km), and the increase of charging stations (from 110,000 in 2014 to 0.9 million in 2020) make electric mobility more attractive [3, 7]. Last but not least, according to scenario calculations, the inventory of electric cars will grow from 20 to 30 million by 2030 to around 25 to 50 vehicles by 2050 due to these developments [3]. The projections for the number of new registrations of electric vehicles of the total new registrations by 2020 and 2030 vary considerably: estimates range from around 2% to 15% (2020) and 7% to 55% (2030) [3].

Individual mobility catches up in emerging economies and nations

With the spread and adoption of Western lifestyles and increasing economic strength, particularly in Asia, data indicates that citizens are catching up in individual mobility; in China, the passenger car transport volume will nearly double to 2,000 billion passenger kilometres per year in 2025 [10]. Sales of small and mid-size cars – increasingly also upper mid-range and all-terrain vehicles – and ownership of cars per capita are rising globally. At 1.7 billion, the number of cars by 2035 will have doubled compared to 2010; the market penetration with passenger cars will grow from 55% in 2010 to 75% in 2030 in developed markets [8, 11]. Thus, there will be a

corresponding upward trend in vehicle performance, vehicle weight and vehicle usage. Hybrid models are enjoying increasing sales numbers and are becoming a strong competitor for cars with a standard internal combustion engine. In China, the sales figures for electric cars have clearly increased since 2010, most recently to 37.6% in 2013 compared to 2012 [8, 12]. As a transitional technology, the increase of hybrid cars supports the transition to electric mobility as the number one mobility concept – however, it significantly increases resource requirements, as hybrid cars have a double drive set-up.

Technological developments make mobility more low-carbon and resource-lighter

In Germany, technological developments in the area of motor performance and lightweight vehicle construction enable significantly increased performance per litre of fuel. This enables a more low-carbon and low-resource mobility. At the same time, biofuels have gained entry into the market. Biofuels are obtained mainly from plant debris, which helps reduce competition for land use with crops; however, this has spurred a conflict between forestry, agriculture as well as nature conservation and species protection. The controversial effects are still being debated. The OECD average for fuel consumption per 100 car kilometres is 8 litres (including SUVs, Minivans, diesel and petrol vehicles); due to new technologies and their better diffusion, fuel efficiency will improve to 4 liters/100km by 2035 [13].

Future intermodality – public transport and carsharing are becoming increasingly important

Intermodal mobility, which is switching (repeatedly) between modes of transport such as cars, public transport, cycling or going by foot, is clearly increasing. Cars in particular are experiencing a loss of importance compared to other modes of transport – they are increasingly seen less as a status symbol or expression of individual freedom but, rather, as a transport option among many and, therefore, are used more pragmatically [3, 8]. In this context, the desire for car ownership, particularly in cities and especially among young adults, is decreasing. Carsharing concepts are becoming very popular. The number of car owners in the age group 18 to 24 decreased by 44% between 2000 and 2010 [1]. In the age group of 18 to 39, 36% more carsharing is attainable by 2020 [1]. At the same, existing public transport, cycling and footpath networks will be expanded and improved, so that inter- and multimodality will accordingly be possible and fostered [3, 8]. Public transport will be multimodally anchored and converted to electromobility, in order to lessen the loss of importance compared to electric cars and to act as the backbone in intermodal transport [14, 15].

Increase of freight and air traffic

Transport activities in freight traffic will increase by at least 25% in 2025 compared to 2011 [14]. The existing freight transport structure (railway lines, streets, waterways) cannot support the growth without undesirable outcomes: congestion intensity is increasing on roads and the susceptibility of delay in rail transport is rising, which leads to problems and economic losses in production and trade [14]. Particularly for inner-city goods transport, the transport requirements in freight traffic pave the way for a switch to hybrid and electric vehicles, as more efficient diesel motors will be used in the heavy load sector [14].

By 2030, the "passenger revenue kilometers" will have almost doubled – from around 3,300 billion today to around 6,300 billion – largely driven by the developments in China and India [16]. In air traffic, a life cycle approach in design and manufacture of airplanes is gradually established. Research and development make flying relatively more ecological, inter alia, due to fuel saving design and weight reduction [16].

Ageing urban infrastructure limits the adaptive capacity to the impact of mobility

The infrastructure in many cities in Germany (and worldwide) is outdated due to insufficient investment funds [17]. This restricts the capacity of cities to adequately adapt to the mobility needs in the field of multi-modal mobility concepts and electric mobility. At the same time, the obligation to modernise infrastructure offers the chance to take new mobility requirements into account during construction. Today, competition for innovative and sustainable mobility concepts is on the rise, fueled by European and national funding. The results, for example, have been the use of physical models for planning the flow of traffic in cities [18], which reduces congestion as well as fuel consumption.

Digitisation reduces mobility requirements

With the opportunities for working digitally as well as digital networking offered by digitisation, there is increasing potential to reduce physical mobility requirements (e.g. business trips, but also daily work commutes) [19] (also see trend topic "digitisation and networking").

CO_2 capture and utilisation

The procedure for carbon capture and utilisation (CCU) uses CO_2 as a raw material for producing chemical precursors (for fuels, chemicals) and polymers (for packaging, automobile production, building materials) and, thus, as an alternative to fossil fuels (oil, gas, coal) [20]. When environmental hazards – particularly for deposition technology – can be

clarified and limited, CCU can help to transform excess electricity from renewable energies. Stored and transported in the form of a synthetic mixture of substances it can be re-transformed into electricity or fuel as needed [21]. The production of biofuel from algae, water and sunlight by means of CCU makes it possible to keep an efficient, coal-based fuel-oriented motor technology and existing transport without exacerbating land-use competition [22].

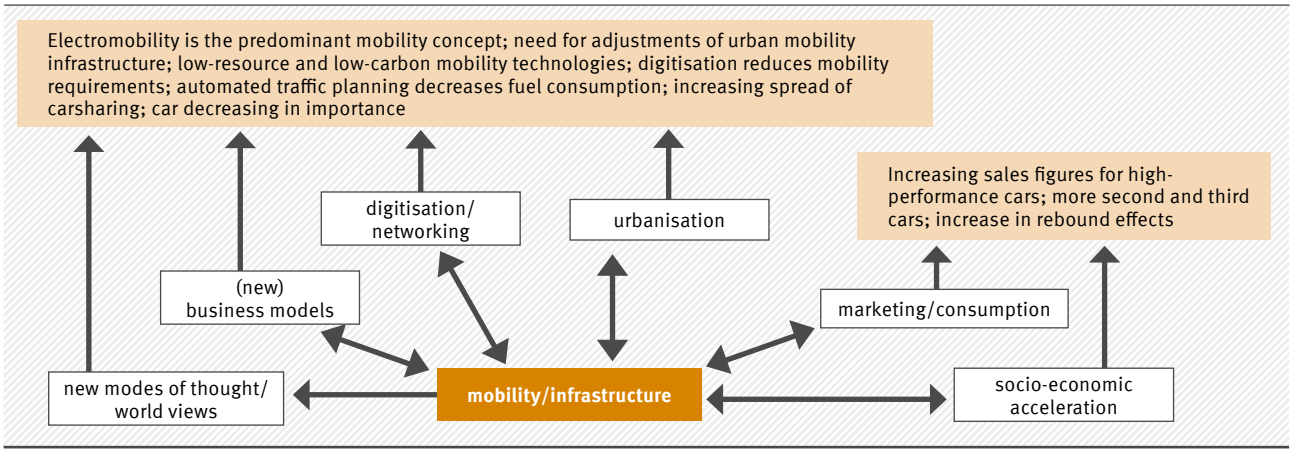
Raw material requirements for the energy transition

The raw materials required for technologies to produce, store, transfer and use renewable energies are increasing with their expansion and vary according to the technical approach and operation area. In 2012, 136,000 tonnes of rare earths were needed globally for the construction of photovoltaic systems [23]. A global production of 7,000 wind farms per year is expected from 2017 to 2030, which, with optimised construction, will need around 2.3 million tonnes of steel, 26,400 tonnes of aluminum, 18,400 tonnes of copper and 152,400 tonnes of glass-fibre reinforced plastic annually [24]. The resource scarcity of rare earths and certain metals leads to a rise in prices, and supply shortages of the raw materials in question limit the expansion of renewable energies such as photovoltaic systems and wind turbines [25, 26, 27]. Sand and gravel, which is especially necessary in infrastructure construction, is also short in supply. Desert sand cannot be used in construction [36].

Possible entry points for resource policy

- Internalise external costs of transport modes
- Build up research funding for alternative drive systems, battery technology, infrastructure, and recycling/substitution of critical or environmentally hazardous raw materials
- Promote purchase of electric vehicles (beyond the mere exemption of motor vehicle tax)
- Introduce access restrictions for cars with internal combustion engines in cities using low emission zones and improved controls and sanctions
- Establish priority car parks and traffic lanes for electric and carsharing cars in city centres
- Increase expansion of public transport, cycling and walking network and subsidise the use of public transport

Links to other trend themes



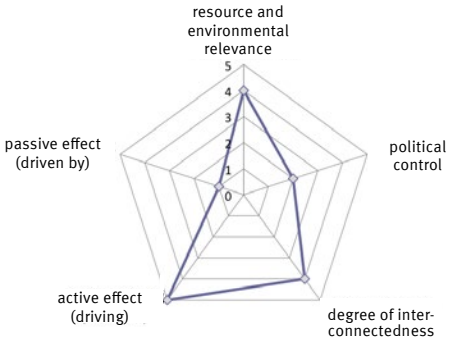
Literature

[1] McKinsey & Company, 2012. Mobility of the Future. Opportunities for automative OEMs. February 2012.
[2] WardsAuto, 2011. World Vehicle Population Tops 1 Billion Units. URL http://wardsauto.com/ar/world_vehicle_population_110815, retrieved on 04.07.2014.
[3] Gnann, Till/Plötz, Patrick, 2011. Status Quo und Perspektiven der Elektromobilität in Deutschland. Karlsruhe: Working Paper Sustainability and Innovation No S14/2011.
[4] KBA, 2013. Jahresbericht 2012. Flensburg.
[5] KBA, 2014. Neuzulassungen - Jahresbilanz der Neuzulassungen Jahr 2013. URL http://www.kba.de/DE/Statistik/Fahrzeuge/Neuzulassungen/neuzulassungen_inhalt.html?nn=644264, retrieved on 02.07.2014.
[6] Bundesverband Carsharing e.V., 2013. Jahresbericht 2012/2013. Berlin, Mai 2013.
[7] Pehnt, Martin (et al.), 2011. Elektroautos in einer von erneuerbaren Energien geprägten Energiewirtschaft, Zeitschrift für Energiewirtschaft 35, 221–234.
[8] Clean Energy Ministerial (et al.), 2013. Global EV Outlook. Understanding the Electric Vehicle Landscape to 2020. April 2013.
[9] McKinsey Global Institute, 2011. Resource revolution: meeting the world's energy, materials, food and water needs. November 2011.
[10] TU Dresden, 2011. Zukunft von Mobilität und Verkehr. Auswertung wissenschaftlicher Grunddaten, Erwartungen und abgeleiteter Perspektiven des Verkehrswesens in Deutschland. Schlussbericht.
[11] IEA, 2012. World Energy Outlook 2012.
[12] China Auto web, 2014. Plug-in EV Sales in China Rose 37.9% to 17,600 in 2013. URL http://chinaautoweb.com/2014/01/plug-in-ev-sales-in-china-rose-37-9-to-17600-in-2013/, retrieved on 04.07.2014.
[13] Global Fuel Economy Initiative, 2012. 50 by 50. Making Cars 50% More Fuel Efficient by 2050 Worldwide.
[14] InnoZ, 2012. Trends 2030. Mobilität und Logistik. InnoZ-Begleitheft zum Innovationsworkshop 2012 der DB AG am 14./15. Juni 2012 im InnoZ, Berlin.
[15] VDV, 2013. Der ÖPNV: Rückgrat und Motor eines zukunftsorientierten Mobilitätsverbundes. Positionspapier / Mai 2013.
[16] Klingauf, U./Azzam, M., 2008. Luftverkehr 2030 – Herausforderungen und Trends. TU Darmstadt, thema forschung 1/2008.
[17] Obernosterer, Richard/ Karitnig, Andreas/ Lepuschitz, Barbara, 2010. Urban Future. Erhebung von Forschungsfragen zum Thema „Resource Efficient City of Tomorrow". Berichte aus Energie- und Umweltforschung, 83/2010.
[18] Boden, Maik/ Weger, Heiko/ Kabitzsch, Klaus, 2013. Effizientere Verkehrsplanung mittels Automatisierungstools. Workshop der ASIM/GI-Fachgruppen Simulation technischer Systeme (STS) und Grundlagen und Methoden in Modellbildung und Simulation (GMMS), Fachhochschule Düsseldorf.
[19] Zukunftsinstitut GmbH, 2011. Die Zukunft der Mobilität 2030, Kelkheim.
[20] Bringezu, Stefan, 2014. Carbon Recycling for Renewable Materials and Energy Supply. Recent Trends, Long-Term Options, and Challenges for Research and Development. Journal of Industrial Ecology, 18, S. 327–340.
[21] Saeidi, Samarand (et al.), 2014. Hydrogenation of CO_2 to value-added products—A review and potential future developments, Journal of CO_2 Utilization, 5, S. 66–81.
[22] Stechel, Ellen/ Miller, James, 2013. Re-energizing CO_2 to fuels with the sun: Issues of efficiency, scale, and economics, Journal of CO_2 Utilization, P. 26–36.
[23] Cho, Renee, 2012. Rare Earth Metals: Will We Have Enough, State of the Planet. URL http://blogs.ei.columbia.edu/2012/09/19/rare-earth-metals-will-we-have-enough/, retrieved on 17.07.2014.
[24] U.S. Department of Energy, 2008. 20% Wind Energy by 2030. Increasing Wind Energy's Contribution to U.S. Electricity Supply.
[25] Bradshaw, Alex/ Reuter, Benjamin/ Hamacher, Thomas, 2013. The potential scarcity of rare elements for the Energiewende. In: Schlögl, R. (Ed.). Green. Band 3, Heft 2, Seiten 93–111.
[26] Kulpinski, Dan, 2013. How to achieve a truly sustainable renewable energy transition, Johns Hopkins Environmental News. URL http://jhens.jhu.edu/2013/05/16/how-to-achieve-a-truly-sustainable-renewable-energy-transition, retrieved on 17.07.2014.
[27] Fridley, David, 2010. Nine Challenges of Alternative Energy, Santa Rosa, California.
[28] Frondel Manuel/ Peters Jörg/ Vance Colin, 2008. Identifying the rebound: Evidence from a German household panel, The Energy Journal, 29: 154–163.
[29] Linn, Joshua, 2013. The Rebound Effect for Passenger Vehicles. Resources for the Future Discussion Paper RFF DP 13–19.
[30] Lee, D.S. (et al.), 2009. Aviation and global climate change in the 21st century, Atmospheric Environment, doi:10.1016/j.atmosenv.2009.04.024.
[31] Leismann, Kristin (et al.), 2012. Nutzen statt Besitzen. Auf dem Weg zu einer ressourcenschonenden Konsumkultur. Heinrich-Böll-Stiftung Schriften zur Ökologie, Band 27.
[32] Steininger, Karl/Bachner, Gabriel, 2014. Extending Carsharing to serve commuters: An implementation in Austria. Ecological Economics 101, 64–66.
[33] Sorge, Nils-Viktor, 2014. Lust am Teilen wächst: Autobauer verkaufen weniger Neuwagen wegen Carsharing. Manager Magazin Online, 27.02.2014. URL http://www.manager-magazin.de/unternehmen/autoindustrie/autobauer-und-ihre-carsharing-dienste-wie-car2go-und-drive-now-a-956018.html, retrieved on 04.07.2013.
[34] Statistisches Bundesamt, 2014. Fahrzeugbestand. URL https://www.destatis.de/DE/ZahlenFakten/Wirtschaftsbereiche/TransportVerkehr/UnternehmenInfrastrukturFahrzeugbestand/Tabellen/Fahrzeugbestand.html, retrieved on 26.07.2014.
[35] Kraftfahrt-Bundesamt, 2014. Der Fahrzeugbestand im Überblick am 1. Januar 2014 gegenüber 1. Januar 2013. Flensburg.
[36] UNEP Global Environmental Alert Service. 2014. Sand, rarer than one thinks.

Trend theme 10

Digitisation and networking

Digitisation increasingly penetrates all areas of life and work. The networking of the individual is on the rise – also the possibilities for each individual person to participate in democratic processes. Status is becoming dematerialised – digital natives create their (online) identity through digitally sharing opinions and experiences.



Status quo

Digitisation describes converting analog information such as sound, image or text into digital form by electronic means. The data can then be saved, edited or transferred [1]. Digitisation, speeded up by the Internet, has already changed large parts of society, work, the economy and policy. The increase of social media platforms counts among the more recent developments. Digitisation and networking are driven primarily by improved and inexpensive memory chips and faster Internet connections. Today, almost 100% of all data is stored digitally (1993: ~ 1%). The exchange of digital information has been growing by 28% yearly since the mid-1980s. Each year around 23% more information is stored, and computer performance grows by 58% [2].

Networking is also driven by (increasingly Internet enabled) mobile devices, which often have high status value. In 2014, more mobile telephone contracts exist than the human population, which is due to a market saturation of 128% in industrial nations. As of 2013, 2.7 billion people had access to the Internet; however, there are considerable regional differences [3]. Around four fifths of all Germans use the Internet on a nearly daily basis, only people over 65 are largely excluded from this development [4]. The majority of Internet users are registered in social networks (78 %), with 67 % being active users [5].

Resource and environmental relevance of the trend theme

The production and use of ICT devices go hand in hand with high environmental pollution and energy consumption. For example, depending on the model, intensity and duration of use, notebooks already cause 40–93% of environmental pollution during production [24]. Apple estimates that 83% of greenhouse gas emissions in the life cycle of the iPhone 5 occur during production [25]. Over 60 types of materials are used in a mobile phone, 30 of which are metals [26]. The average mobile phone has an material footprint of over 75 kg [27]. The production area for mobile phones and computers includes around 15% of global cobalt production, 13% of palladium and 3% of gold and silver mining. By 2007, the production, use and disposal of ICT devices had already caused 2% of the global greenhouse gas emissions, which is comparable to global air traffic [28]. While mineral concentrations in ore decreases and the use of information and communication technologies increases, the consumption of resources is likely to be carried out more resource-intensively in the future. Furthermore, the recycling rate for ICT devices in low – for example, only 2–3% of all mobile telephones are properly recycled. Small ICT devices, like tablets, mobile phones and smartphones are usually not built in a modular way. To save space, components are glued in, which makes neither repair nor recycling possible. Although laptops and PCs can still be partly dismantled, the users often do not have the technical know-how to make repairs. Costs for repair often exceed the costs for a new replacement.

In motion: trends and developments

Increasing digitisation of all areas of life

Memory and transfer capacities will continue to increase. Digitisation will increasingly penetrate all areas of life and work. Work processes will be further accelerated as a result of networking (also see trend theme "working world"). At the same time, intelligent assistant systems in Industry 4.0[27] production processes enable aligning with the possibilities of the labour force [6]. The "Internet of Things" will be everyday life: objects will be equipped with sensors and computing power and will be connected to the Internet. This will change to working world: in networked Industry 4.0, facilities will be equipped with embedded ICT systems (cyber-physical systems), which will optimise monitoring and decision-making processes [7]. Production will be more flexible and individual and will create opportunities for new business models (also see trend theme "(new) business models") [6]. The private sphere will also be further digitised: smart homes, intelligent clothing and e-accessories are increasing. What cannot be foreseen is which applications will prevail [8]. In light of the growing use of electronics and the high frequency of hardware replacement, an increase in resource and energy consumption is likely [9]. The high pace of innovation in the ICT field continues to increase, also due to the fact that increasingly more people work in the ICT sector. Thanks to Web 3.0 (Semantic Web), automation will penetrate new software and artificial intelligence all the way to knowledge work: knowledge work will increasingly be done by intelligent machines which, for example, can answer non-structured questions [10].

Digitisation of trade and advertising

The market share and importance of online business continues to increase, while offline business is decreasing [11, 12] (also see trend theme "(new) business models"). Personalised online advertising generated by user data is growing and will be further optimised [13, 14, 15] (also see trend theme "marketing/consumption"). The Internet of Things will further reinforce this trend: in the future, Internet-capable cars will save the habits and preferences of the user, and location-specific radio advertising as well as advertising suited to individual preferences will be connected. Information about driving duration, stops, music preferences and routes can

be saved and analysed [16]. Similar developments are expected with smart homes: for example, Google took over the home automation company Nest. Among other features, they produce thermostats that can be controlled over tablets which will be able to adapt to the behaviour and preferences of the user [17]. At the same time, digitisation also enables new sharing economy approaches as well as an exchange of information about fair and organic products (also see trend theme "(new) business models").

New participation opportunities

Digitisation also changes the relationship between citizens and the state. Social media, open government[28] and e-government[29] create new opportunities for participation. At the same time, surveillance and influence of the state are increasing. The surveillance scandal of NSA and BND as well as social networks and various online services sending user data have shattered confidence in data protection: use of e-government offers decreased from 45% to 36% between 2012 and 2013. During the same period, the fear of data theft rose from 4% to 61% [18].

Globally, there is an increase in political transparency due to digitisation and networking; non-transparent systems come under pressure. The high availability of data and access to social media also increase the participation of disadvantaged groups. However, the Internet was increasingly restricted in the past 3 years. According to a study conducted by Freedom House, Internet freedom has decreased in 34 out

27 | Definition: "A real-time intelligent, horizontal and vertical networking of humans, machines, objects and ICT systems to enable dynamic management of complex systems" [29]
28 | Definition e-Government Monitor: "Open government stands for the opening of government and public administration to citizens and the economy. The goal is more transparency, more political participation and more intensive cooperation between governments and the governed."
29 | Definition e-Government Monitor: "Information and services from public authorities and institutions (municipality, city, county, etc.), which can be used over the Internet."

of 60 countries. Even in democracies, the security risks involved in digital penetration are partly answered by restrictions or misuse of the Internet. For the monitoring purposes, German law enforcement authorities have installed spyware on the PCs of suspects. Freedom House observed a slight deterioration of Internet freedom in Germany [13].

Technology trends reduce hardware needs

Technical developments will continue to be key driving forces in various areas of life and work. Cloud computing and central repository will continue to spread, as long as confidence in data security is maintained. The related decline of software and hardware in companies can reduce resource requirements. The development of control systems which can almost be managed without hardware (e.g. Leap Motion) could also have a positive effect on resource efficiency.

Robots, which will be used in the future at work and everyday life, will probably significantly increase technology-driven resource requirements. Intelligent robots will have a high range of uses: they will be used as much in service fields, e.g., for cleaning buildings, as they will in medical fields [10]. Autonomous vehicles will increase road safety and decrease petrol consumption and congestion – however, they also pose security risks [19, 20].

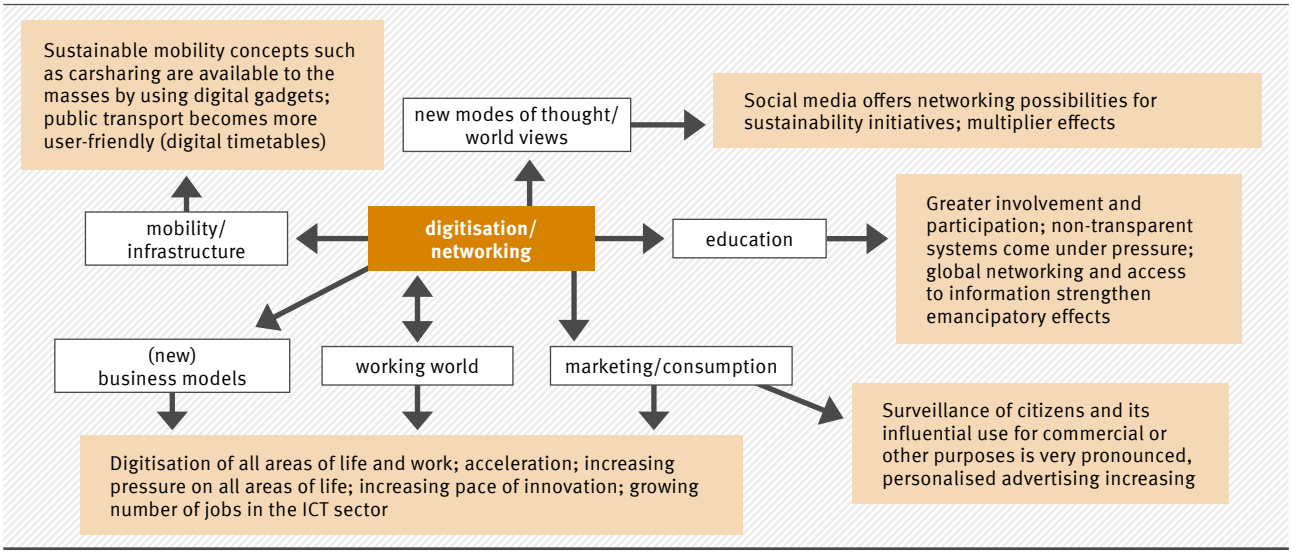
Energy – smart metering implementation

In the energy field, the use of digital applications offers efficiency potential and will especially grow proportionally to burden sharing and demand management: the EU directive on energy end-use efficiency and energy services (2006/32/EC) will provide a full coverage of 80% of all households with intelligent metering systems (smart meters) by 2020 [21]. In Germany, the amended Energy Act of 2011 regulates the installation of intelligent power meters with a yearly consumption of 6,000 KWh. Installing smart meters offers consumers more transparency and the possibility to receive timely information about their electricity consumption [22]. A full-scale implementation is expected in Germany in 2029 [23].

Possible entry points for resource policy

- Analysis of the resource efficiency of online shopping and adapted policy measures. Savings potentials are possible, for example, by means of packaging regulations as well as the regulation of return procedures
- Introduce a resource Top Runner programme for electronics and household appliances
- Incorporate recycling know-how more strongly into development cooperation programmes
- Identify and limit incentive systems which shorten how long a product is used (for example, the replacement of functioning mobile devices within the framework of mobile telephony agreements)
- Increase minimum warranty period to raise product quality
- Integrate manufacturers more strongly into the recycling process in order to foster an incentive system for the manufacture of ICT devices which are easy to recycle
- Increase transparency:
  - Manufacturers could be encouraged to publish repair instructions (including an assembly drawing of the device)
  - Improve the proof of origin for raw materials and components
  - Provision of spare parts catalogue and ordering systems (e.g. production plans for 3D printers)

Links to other trend themes



Literature

[1] Hans-Bredow-Institut. 2006. Medien von A bis Z, VS-Verlag für Sozialwissenschaften, Wiesbaden.

[2] Hilbert, Martin/López, Priscila, 2001. The World's Technological Capacity to Store, Communicate, and Compute Information. Science, 692–693, Feb. 11, 2011. DOI: 10.1126/science.1200970.

[3] Internationale Fernmeldeunion, 2013. URL http://www.itu.int/net/pressoffice/press_releases/2013/05.aspx#.U8fbwhB5aIB, retrieved on 17.07.14.

[4] Statistisches Bundesamt, 2013. URL https://www.destatis.de/DE/ZahlenFakten/GesellschaftStaat/EinkommenKonsumLebensbedingungen/ITNutzung/Aktuell_ITNutzung.html;jsessionid=A1FEB62407B7E623EB483056E62E0512.cae1, retrieved on 17.07.2014.

[5] BITKOM, 2013. Soziale Netzwerke 2013. Dritte, erweiterte Studie. Eine repräsentative Untersuchung zur Nutzung sozialer Netzwerke im Internet. Berlin.

[6] Plattform Industrie 4.0, 2014. Chancen durch Industrie 4.0. URL http://www.plattform-i40.de/hintergrund/potenziale, retrieved on 21.07.2014.

[7] Bundesministerium für Bildung und Forschung, Zukunftsbild „Industrie 4.0". URL http://www.bmbf.de/pubRD/Zukunftsbild_Industrie_40.pdf, retrieved on 21.07.2014.

[8] PC Welt, 2012. Anziehend - Intelligente Kleidung und E-Accessoires. URL http://www.pcwelt.de/ratgeber/Wearable-Computing-6596070.html, retrieved on 21.07.2014.

[9] Die Presse, 2014. Intelligent heißt noch nicht sparsam. ULR http://diepresse.com/home/wirtschaft/economist/1556600/Intelligent-heisst-noch-nicht-sparsam, retrieved on 21.07.2014.

[10] Manyika, James (et al.), 2013. Disruptive technologies: Advances that will transform life, business, and the global economy. McKinsey Global Institute.

[11] Handelsverband Deutschland, 2014. E-Commerce-Umsätze. URL http://www.einzelhandel.de/index.php/presse/zahlenfaktengrafiken/Internetunde-commerce/item/110185-e-commerce-umsaetze, retrieved on 21.07.2014.

[12] Studie Life, 2009. Digitales Leben. URL http://www.studie-life.de/life-studien/digitales-leben/, retrieved on 21.07.2014.

[13] Kelly, Sanja (et al.), 2013. Freedom on the net 2013. A Global Assessment of Internet and Digital Media, Freedom House.

[14] WISO, 2014. Gefälschte Bewertungen. URL http://www.zdf.de/wiso/gefaelschte-bewertung-in-Internetportalen-und-im-online-shop-30955964.html, retrieved on 21.07.2014.

[15] Marketing Börse, 2014. Onlinemareting Trends 2014 – Personalisierung und Targeting als Chance. URL http://www.marketing-boerse.de/Fachartikel/details/1407-Onlinemarketing-Trends-2014---Personalisierung-und-Targeting-als-Chanc/46183, retrieved on 21.07.2014.

[16] Mashable, 2014. Connected Cars May Eventually Inspire Place-Specific Radio Ads. URL http://mashable.com/2014/07/16/connected-car-radio-ads/, retrieved on 21.07.2014.

[17] ifun, 2014. Intelligente Heizungsregelung: Google übernimmt Nest für 3,2 Milliarden Dollar.- URL http://www.ifun.de/intelligente-heizungsregelung-google-uebernimmt-nest-fuer-32-milliarden-dollar-53170/, retrieved on 29.07.2014.

[18] Initiative D21 e.V./Institute for Public Information Management, 2013. E-Government Monitor 2013. Nutzung und Akzeptanz von elektronischen Bürgerdiensten im internationalen Vergleich, Berlin.

[19] Byczkowski, Thomas, 2013. Computer am Steuer. URL http://www.zeit.de/zeit-wissen/2013/03/autonomes-auto-google-fahrzeugindustrie, retrieved on 21.07.2014.

[20] Heise, 2014. FBI: Autonome Autos könnten als tödliche Waffen dienen. URL http://www.heise.de/newsticker/meldung/FBI-Autonome-Autos-koennten-als-toedliche-Waffen-dienen-2261802.html, retrieved on 21.07.2014.

[21] Europäische Union, 2006. Richtline 2006/32/EG des Europäischen Parlaments und des Rates vom 5. April 2006 über Endenergieeffizienz und Energiedienstleistungen und zur Aufhebung der Richtlinie 93/76/EWG des Rates, Brüssel.

[22] Deutsche Energie-Agentur (DENA), 2011. Intelligente Zähler. Smart Metering: Ein Lösungsbaustein für ein zukunftsfähiges Energiesystem. URL http://www.dena.de/fileadmin/user_upload/Publikationen/Energiesysteme/Dokumente/InfobroschA1_4re_Intelligente_ZA__hler.pdf, retrieved on 21.07.2014.

[23] Tesche, Carola, 2014. Smart-Meter-Rollout – eine langwierige Aufgabe, VDI Nachrichten, URL http://www.vdi-nachrichten.com/Technik-Wirtschaft/Smart-Meter-Rollout-langwierige-Aufgabe, retrieved on 21.07.2014.

[24] Prakash Siddharth / Liu, Ran, 2012. Zeitlich optimierter Einsatz eines Notebooks unter ökologischen Gesichtspunkten. Studie für das Umweltamt, Dessau-Roßlau.

[25] Apple, 2014. iPhone 5s Environmental Report. URL http://images.apple.com/euro/environment/reports/a/generic/docs/iPhone5s_product_environmental_report_sept2013.pdf, retrieved on 21.07.2014.

[26] IASS, 2013. Handys, Ressourcen und Nachhaltigkeit – Widerspruch oder Vision für die Zukunft?" – Abschlusskonferenz mit IASS-Exekutivdirektor Klaus Töpfer. URL http://www.iass-potsdam.de/de/forschungscluster/plattform-enabling-technologies-sustainability/news-0/handys-ressourcen-und, retrieved on 21.07.2014.

[27] Informationszentrum Mobilfunk, 2014. Lebenszyklus eines Handys und „ökologischer Rucksack". URL http://www.izmf.de/de/content/lebenszyklus-eines-handys-und-%E2%80%9E%C3%B6kologischer-rucksack%E2%80%9C, retrieved on 21.07.2014.

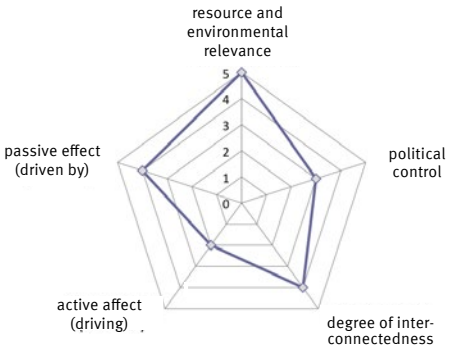
[28] Wuppertal Institut, 2013. 18 Factsheets zum Thema Mobiltelefone und Nachhaltigkeit. Wuppertal.

[29] Bauer, Wilhelm (et al.), 2014. Industrie 4.0 – Volkswirtschaftliches Potenzial für Deutschland Studie. BITKOM/Fraunhofer Institut für Arbeitswirtschaft und Organisation. Berlin.

Trend theme 11

Marketing and consumption

Consumption patterns in emerging countries are similar to those of Western lifestyles. Advertising establishes product ownership and consumption as giving a sense of meaning and identity. Consumption is increasingly taking place through e-commerce, which enables companies to offer personalised advertising and products by using and analysing consumer behaviour over social media.



Status quo

In Germany and industrialised nations, unsustainable consumption patterns prevail which lead to substantial consumption of resources and significant environmental impacts [1, 2, 3]. Driving forces such as low prices, the high availability of goods and the effect of consumption and possession giving a sense of meaning and identity contribute significantly to a consumer behaviour which goes far beyond what is needed to satisfy basic needs [1, 4, 5].

Between 2008 and 2013, consumer spending in German households increased in nearly all areas of demand: for clothing and shoes from around EUR 67 billion to over EUR 73 billion; for furnishings, appliances and household utensils and equipment from just under EUR 83 billion to about EUR 92 billion; for purchasing vehicles and the use of transport services from around EUR 65 billion to approximately EUR 68 billion, and from about EUR 33 billion to nearly EUR 40 billion, respectively [6].

In principle, consumers have the desire to consume (more) sustainably; however, actual purchasing decisions are often less sustainable due to ignorance, laziness, social practices and a lack of incentives [7, 8].

In Germany, marketing and advertising received a much larger budget than consumer education and counseling – there is a large discrepancy here between advertising expenditure (EUR 30 billion in 2011 for fees/salaries , production of advertising materials and media distribution of advertising) [9] and spending on consumer advice (almost EUR 52 million in 2011 on the federal budget for the German association of consumer organisations (Verbraucherzentrale Bundesverband e.V.), subsidy and foundation capital for Stiftung Warentest and information for consumers) [10].

Resource and environmental relevance of the trend theme

As a rule of thumb, increased marketing strength promotes consumption, i.e., the more consumption, the more consumption of resources [13]. The demand for materials and energy as well as for the development of infrastructure increases significantly with the collectivisation of Western consumption and production patterns. For example, the per capita material consumption rises from 8 to 16 tonnes [1,25], fossil fuel-dominated energy use rises by 80% [26], and the global greenhouse gas emissions by 50% [27].

The increasing demand for larger living space per person also means greatly increased energy and material requirements which, due to rebound effects, also undoes efficiency gains made through improved technology. For Germany, studies suggest that energy savings obtained through energy efficiency programmes with an investment in energy cost savings leads to rebound effects in increased energy consumptions, which consume more than 5% of the CO_2 emissions savings [28]. A focus on purely technical solutions is not enough; consumption behaviour is similarly as relevant.

Growth in e-commerce requires a rise in energy use for online transactions and leads to an increase in the consumption of packaging material for products and shipping, however, it reduces transport requirements due to well-coordinated logistics compared to the transport of the customer to the goods and back, which is mainly done with individual mobility structures (for environmental relief potential also see trend theme "(new) business models").

Strengthening the sharing economy by more use of functions instead of product ownership reduces resource requirements and lessens environmental impacts. On the one hand, fewer new or additional products need to be manufactured. On the other hand, the products are used longer or more intensively which reduces unnecessary use of the product, because the product is not always present in the household [29].

In motion: trends and developments

Consumption catches up in emerging countries

The middle class is growing in many emerging and developing nations. New middle-class consumers increasingly follow Western – non-sustainable – consumption patterns [11, 12] (also see trend theme "socio-economic acceleration").

Advertising presents consumption as giving a sense of meaning and identity

Whether it is done through connecting a product with a social or environmental protection pledge, with roll models or with the suggestion of the "one true lifestyle," advertising is loaded with "meaning" even more strongly than before. With this attribution of cultural values, ideals of beauty and lifestyle role models, advertising connects the consumption of products to perceived social standing and therefore an individual's sense of identity and social importance; thus, enabling the creation of consumer societies [13]. Consumption therefore increasingly has the effect of imparting status. One's own position in the social fabric is increasingly ensured by consumption and product ownership – with high and constant consumption and the costs this entails [13].

Consumer needs are increasingly satisfied online

Consumers are increasingly shifting their purchasing habits to the Internet, especially for ICT products, but also more and more for fashion products [14] (also see trend theme "(new) business models"). In 2014, the market share for e-commerce is expected to rise to 9% of total trade [15]. Today, almost 70% of all Internet users make purchases online. More than three quarters of all Internet users get information on the Internet before purchasing a product [16]. Information feedback for consumers and corporations is also increasing with Internet use and e-commerce [17]. However, though consumers can better exchange product information, 20-30% of customer reviews are considered fake [18] (also see trend theme "(new) business models").

Increasing digitisation and personalised advertising

Companies recognise the opportunity and necessity of approaching online consumers. Between 2013 and 2018, the global media spending for online services will increase by 12.2% – therefore, they will make up around two thirds of the expected growth in global media spending during this period [19]. Advertising has the largest share of the increase in spending on online services – in 2018, it is expected that one third of all advertising revenues will come from online services [19]. The advertising revenue generated worldwide from the Internet will rise to almost USD 190 billion by 2016 [20]. In Germany, the advertising budget of businesses for online marketing was increased from 4.5% in 2011 to 9.6% of the total advertising budget in 2014 [21].

The opportunities presented by digitisation are used to increasingly personalise advertising. To achieve this, the key strategy of companies is building consumer

confidence, which is promoted via social media contacts and personal exchange [22,24]. In the context of social commerce, products are also offered over these channels in social networks like Facebook, sometimes at a discount but with no additional services [21] (also see trend theme "digitisation and networking").

Another strategy uses the online tracks which consumers leave behind from their digital purchasing processes. Companies have the opportunity to use feedback about consumer behaviour for product development and sales purposes and to make personalised promotional offers accessible to individuals according to their preferences [22, 24]. Customised promotional offers via online services and interactive television gain greater access to the consumers' private sphere as well as public space via digital outdoor advertising [13, 23].

Privacy concerns are increasing and must be taken seriously by companies

Online, "transparent" customers have growing concerns about data protection with regard to disclosure of personal data. Therefore, the customer anticipates the presence of personalised advertising. Companies are therefore increasingly faced with the challenge to take both privacy concerns seriously as well as to communicate accordingly how data is being handled, i.e., also provide verifiable equivalent values for the disclosure of data [21, 22, 24]. At the same time, consumers have more information about products and can exchange information about products on the Internet. Many consumers use these opportunities to demand more sustainable products (also see trend theme "(new) business models").

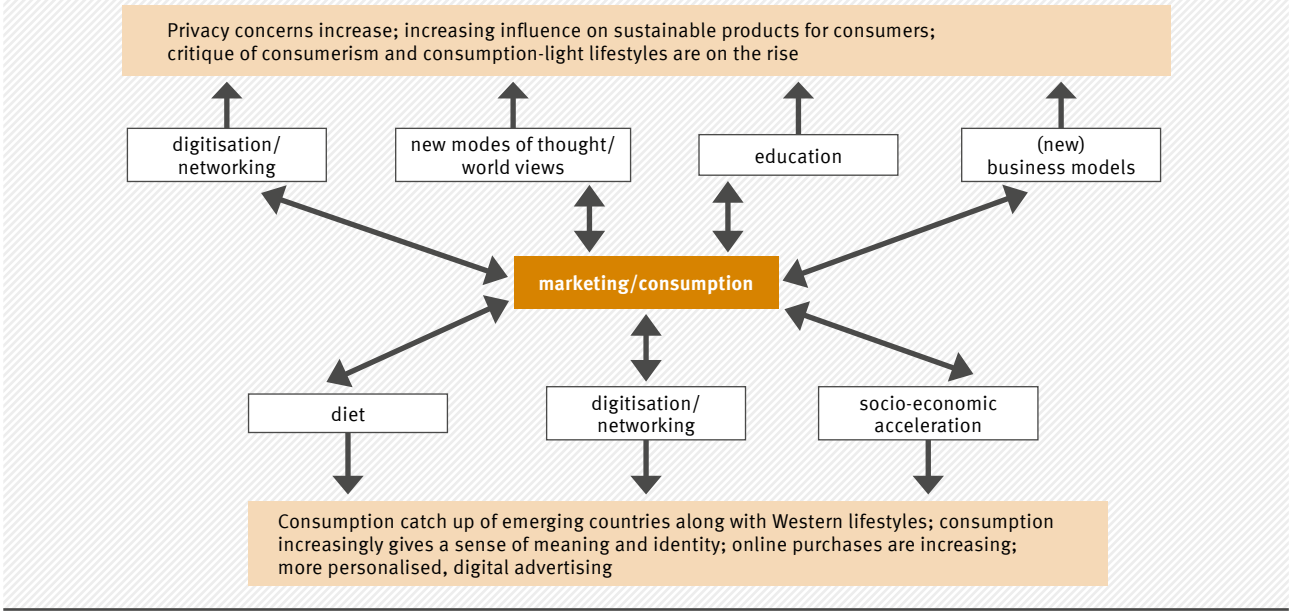
Critique of consumerism and low-consumption lifestyles are increasing

In industrialised nations, the desire for low-consumption lifestyles is growing and sufficiency is being discussed. Part of the population follows lifestyles in which owning products is at least partially replaced by using products (also see trend theme "new modes of thought/world views"). As a result, new business models are also emerging (also see trend theme "(new) business models").

Possible entry points for resource policy

- Advertising regulation for products that are obviously not sustainable
- Education and information about the effects of advertising; foster the discussion about well-being
- Foster more sustainable consumption patterns through reduced VAT rates for sustainable products and services and promote more trustworthy ecolabels and/or the criteria a company must fulfill for ecolabels
- Promote concepts of a shared economy through a supportive framework

Links to other trend themes



Literature

[1] EEA, 2012. The European environment - State and outlook 2010 – Consumption and the environment 2012 update. European Environment Agency.

[2] World Business Council for Sustainable Development, 2008. Sustainable Consumption Facts and Trends. From a business perspective.

[3] EEA, 2013. Environmental pressures from European consumption and production. A study in integrated environmental and economic analysis. EEA Technical report No 2/2013.

[4] Tay, Luis/Diener, Ed, 2011. Needs and Subjective Well-Being Around the World. Journal of Personality and Social Psychology 101, 354–365.

[5] Neef, Max (et al.), 1991. Human Scale Development. Conception, Application and Further Reflection. The Apex Press, New York.

[6] Destatis, 2014. Volkswirtschaftliche Gesamtrechnungen. Private Konsumausgaben und Verfügbares Einkommen. Beiheft zur Fachserie 18. Statistisches Bundesamt, Wiesbaden.

[7] Mont, Oksana/Power, Kate, 2009. Understanding factors that shape consumption. ETC/SCP Working Paper No 1/2013. Copenhagen.

[8] Crompton, Tom/ Kasser, Tim, 2009. Meeting Environmental Challenges: The Role of Human Identity. WWF UK.

[9] Zentralverband der Deutschen Werbewirtschaft, zitiert in: Enquete-Kommission „Wachstum, Wohlstand, Lebensqualität – Wege zu nachhaltigem Wirtschaften und gesellschaftlichem Fortschritt in der Sozialen Marktwirtschaft“, 2013. Schlussbericht. Deutscher Bundestag, 17. Wahlperiode, Drucksache 17/13300, P. 133.

[10] Bundesfinanzministerium, 2012. Bundeshaushaltsplan 2011. Einzelplan 10. Bundesministerium für Ernährung, Landwirtschaft und Verbraucherschutz, Berlin, P. 23.

[11] Kharas, Homi, 2010. The emerging middle-class in developing countries. OECD Development Centre Working Paper No. 285. Organisation for Economic Co-operation and Development. Paris.

[12] McKinsey Global Institute, 2011. Resource revolution: meeting the world‘s energy, materials, food and water needs. November 2011.

[13] Enquete-Kommission „Wachstum, Wohlstand, Lebensqualität – Wege zu nachhaltigem Wirtschaften und gesellschaftlichem Fortschritt in der Sozialen Marktwirtschaft“, 2013. Schlussbericht. Deutscher Bundestag, 17. Wahlperiode, Drucksache 17/13300.

[14] BITKOM, 2013. Trends im E-Commerce. Konsumverhalten beim Online-Shopping. Berlin.

[15] Handelsverband Deutschland, 2014. E-Commerce-Umsätze. URL http://www.einzelhandel.de/index.php/presse/zahlenfaktengrafiken/Internetunde-commerce/item/110185-e-commerce-umsaetze, retrieved on 21.07.2014.

[16] Studie Life, 2009. Digitales Leben. URL http://www.studie-life.de/life-studien/digitales-leben/, retrieved on 21.07.2014.

[17] Kelly, Sanja (et al.), 2013. Freedom on the net 2013. A Global Assessment of Internet and Digital Media, Freedom House.

[18] WISO, 2014. Gefälschte Bewertungen. URL http://www.zdf.de/wiso/gefaelschte-bewertung-in-Internetportalen-und-im-online-shop-30955964.html, retrieved on 21.07.2014.

[19] PwC, 2014. PwC Issues Global Entertainment and Media Outlook 2014-2018. URL http://press.pwc.com/global/pwc-issues-global-entertainment-and-media-outlook-2014-2018/s/5be3359b-db3a-4097-b694-a38e35bc0b4b, retrieved on 21.07.2014.

[20] PwC, 2012. Alles digital, immer online – Medienumsatz steigt dank Internet, Smartphone und Tablet. URL http://www.pwc.de/de/pressemitteilungen/2012/alles-digital-immer-online-medienumsatz-steigt.jhtml, retrieved on 21.07.2014.

[21] Stone, Merlin/ Woodcock, Neil, 2014. Interactive, direct and digital marketing: A future that depends on better use of business intelligence. Journal of Research in Interactive Marketing 8, 4–17.

[22] KMPG, 2012. Consumer Markets. Trends im Handel 2020.

[23] Scholl, Gerd/Raabe, Thorsten, 2011. Nachhaltiger Konsum ohne Eigentum. Ökologisches Wirtschaften 26, 30–34.

[24] Tucker, Catherine, 2012. The economics of advertising and privacy. International Journal of Industrial Organization 30, 326–329.

[25] UNEP, 2011. Decoupling natural resource use and environmental impacts from economic growth, A Report of the Working Group on Decoupling to the International Resource Panel.

[26] van den Berg, Maurits (et al.), 2011. EU Resource Efficiency Perspectives in a Global Context. The Hague: PBL Netherlands Environmental Assessment Agency.

[27] OECD, 2012. OECD Environmental Outlook to 2050: The Consequences of Inaction. OECD, Paris.

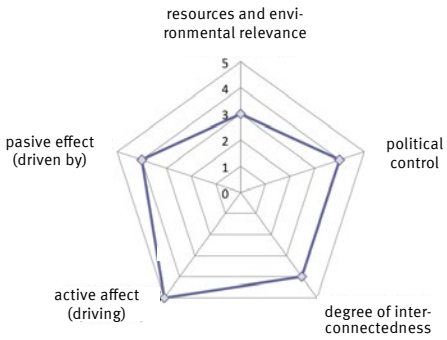
[28] Irrek, Wolfgang/ Thomas, Stefan, 2006. Der EnergieSparFonds für Deutschland. Hans-Böckler-Stiftung, Düsseldorf.

[29] BITKOM, 2013. Shareconomy – Das Internet schafft eine Kultur des Teilens. URL http://www.bitkom.org/de/markt_statistik/64018_75237.aspx, retrieved on 07.07.2014.

Trend theme 12

Education

The trend towards higher qualification continues. This helps combat the lack of skilled workers in academic careers, but not in other occupations. Schools and universities are becoming economised, which affects both the institutions as well as the curricula. The equalisation of educational opportunities achieved by digitisation and networking partially counters this. Lifelong learning and networked thinking are becoming more important and supported in this environment.



Status quo

The level of education in Germany is high and continues to rise; adults are at OECD average in reading and mathematical competencies. Younger generations frequently have higher levels of education than older generations: 43% of 30–35 year olds have a higher education entrance qualification for university entrance (Hochschulreife), around a third finished intermediate school (Mittlere-Abschluss) and about a fifth have the general leaving certificate (Hauptschulabschluss). At the same time, the number of those who have no vocational qualification is growing in younger generations; this disproportionately affects young adults with a migration background [1]. Although slight improvements have been achieved in recent years, social background still heavily determines educational and subsequent economic success [2].

Expenditure on education, science and research amounted to EUR 247.4 billion (2012), which corresponds to 9.3% of the GDP. Of the approximately 96,000 educational institutions, around two-thirds are public institutions; almost one third are independently operated, which is an increasing tendency. Due to the declining number of pupils, the number of general education schools is waning. The number of day care centres and universities is continuing to increase. In 2012/2013 around 16.6 million people used these educational opportunities in Germany [1].

Resource and environmental relevance of the trend theme

The focus of education on economic purposes narrows the horizon of students and pupils and, in the long-term, also that of society. Alternative ways of thinking, creativity and collaboration can be hindered. In such an environment, issues such as sustainability and social justice will be given a much lower priority. Introducing sustainability issues into various fields of study can counteract this and promote a long-term shift towards sustainability and resource efficiency. Environmental studies programmes and their graduates can create eco-innovations. Strengthening networked thinking could produce social innovations that enable social adaptation towards more sustainable economies and lives.

In motion: trends and developments

Trend towards higher qualifications

In Germany, there is a trend towards higher qualification, which is reflected in the rising percentage of educational programmes in secondary education (2.4% increase from 2012 to 2013) as well as in the increase of university students [3].[30] In 2000, the number of university students was still 1,718,445; in 2013, with approximately 2,613,000, it was almost twice as high as the number of apprentices [4]. For the first time in 2013 – due to double the amount of A-level pupils and the trend towards higher qualifications – there were more students than apprentices [3]. In contrast, at the end of 2011 there were more vacant vocational training places than applicants [5]. The percentage of students of the same age group rose from 25.8% in 1995 to 53% in 2012 [6].

The demographic change caused by the shortage of skilled workers in certain occupations, such as manual trades, is exacerbated by the trend of upskilling (also see trend theme "working world"). Since 2005, the number of vacant vocational training places has increased almost continuously, from 12,636 to 29,689 in 2011 [5]. Human resources determine the future growth of companies and are important for competitiveness and innovation capacities of the German economy.

Marketisation of the educational landscape in schools...

The educational landscape has been economised and has been strongly adapted to the – supposed – needs of the economy [7]. Since the "PISA shock" of 2000, educational activities have increasingly been subject to efficiency criteria, and performance standards and evaluations have gained significant importance [8]. The marketisation is also reflected in a change of emphasis in lesson content: humanities and artistic learning content is losing out, while STEM[31] subjects are gaining in importance [9] (also see trend theme "socio-economic acceleration").

This development is increasingly criticised [10] and is perceived as a narrowing of education [9], where the education system submits to the interests of the economy. Marketisation is seen here as a danger to the core values of society and democratic awareness [11]. There is no telling yet what dynamic will evolve from this criticism [11].

...and universities

Further dimensions are the marketisation of educational services and educational institutions as such. Education institutions increasingly depend on business control patterns and are in competition with one another [12]. This is especially true for universities due to the increasing significance of third-party funds. In 2010, about 28 % of the total revenues of German universities came from from external funding. For engineering, 89% stems from third-party funding, and for mathematics/science almost 93% [13].

Worldwide, scientific projects are under high pressure to justify themselves: funding for projects without direct economic benefits will be cut or funds will be discontinued.

In this way, the marketisation driven by the acceleration is spreading to many areas of life. Even childhood education is often oriented towards skills which can later serve the economy [14]. As a result of marketisation, in the course of the Bologna Process, performance and time pressure is generally increasing in universities, which not only leads students having narrow CVs, but also to a higher dropout rate [14].

Lifelong learning and networked thinking

Longer working lives, rapid processes of change and a high level of networking increase the need for lifelong learning [14]. Participation in continuing education, however, has changed little in recent years.

As a result of globalisation, the importance of language and network competencies is growing [15]. The accumulation of knowledge is becoming less important, because knowledge can be acquired in the shortest possible time due to technological development and digitisation. Instead, solution-oriented, networking and long-term thinking is increasingly required [14, 16]. Traditional education schemes cannot meet the demands of a networked world and its increasingly complex challenges. It rather inhibits innovations that would result from the networking of knowledge and cooperation [14]. However, the inaction of the global education system towards change prevents a rapid shift away from individualised and measurable individual performance, linear thought patterns as well as the accumulation of separate knowledge [14].

Equalisation of knowledge through digitisation and networking

The Internet increasingly enables education regardless of family or cultural background and improves education in rural regions [17]. Open source culture, open access and Creative Commons allow free access to scientific literature, sources and other

30 | By 2020, for demographic reasons, the percentage of eligible students of the same age group will sink to 44 %, the number of students will decline to 2.3-2.5 million and, consequently, decrease the number of graduates by 2019 (KMK).
31 | STEM stands for Science, Technology, Engineering, Mathematics degrees.

information materials. By using open source educational software, users can acquire knowledge more easily. With open source software, working on the PC is also possible with less capital investment as many high quality office and graphic programs are available free of charge. For example, the Ubuntu operating system and the associated project Edubuntu give schools and communities access to easy-to-use learning software and systems [18]. A large number of learning platforms brings together learners or can directly be used as an application for learning [19]. Although only 13 years old, Wikipedia has 30 million articles in 280 languages [20].

Free access to knowledge extends to higher education. Massive open online courses (Moocs) offer lectures by renowned professors, which can be viewed worldwide free of charge. Testing for learning progress and obtaining certificates is also possible [21]. On platforms such as EdX [22] and Coursera [23], students can watch lectures on almost all subjects; on average, 33,000 students follow the lectures [24]. Other platforms, such as the Khan Academy [25], are aimed primarily at pupils. After introducing online courses – where learners who did not understand something were able to see the explanation several times – failure rates could be significantly reduced for some courses [21].

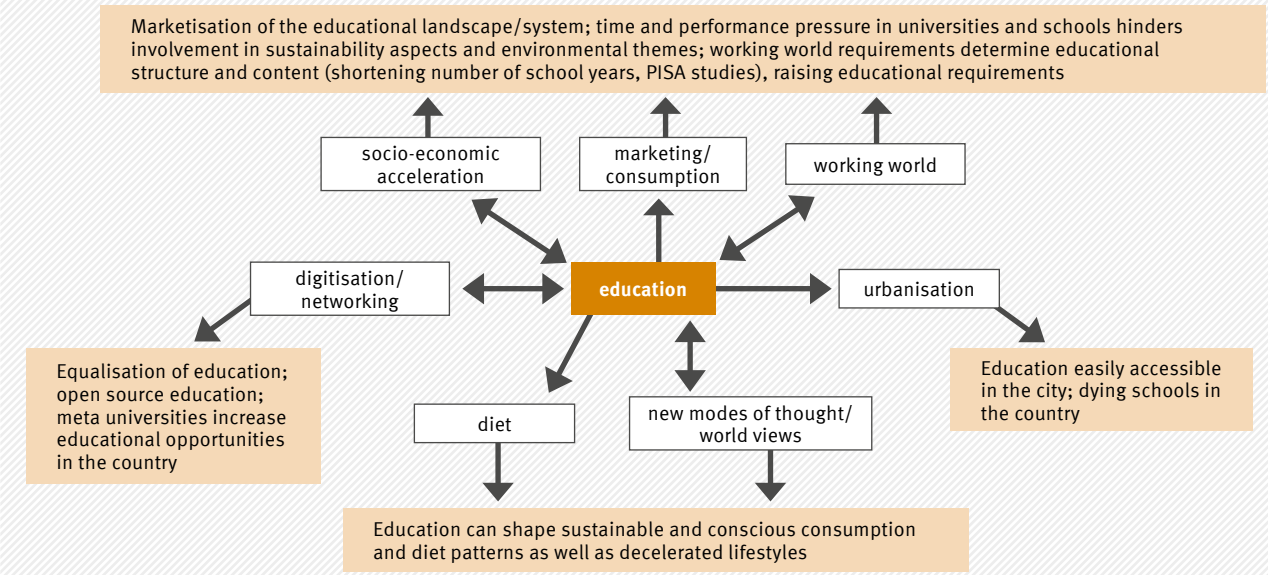
Despite marketisation: sustainability in STEM subjects and economics teaching

At several universities, the content of some study subjects is changing. STEM subjects increasingly focus on sustainability and economics teaching moves away from neoliberalism in favor of empiricism of the common good. Although these developments initially only have a niche character, education can thus strengthen and speed up long-term countermovements (also see trend theme “new modes of thought/world views”).

Possible entry points for resource policy

- Foster network thinking in schools in universities (early linking of learning and working phases), teamwork instead of individual assessments
- Life-long learning: also impart knowledge of economic processes and environmental impacts
- Integrate sustainability aspects into training and studies
- Competitions which foster creativity, innovations and teamwork (especially eco-innovations)
- More strongly foster cross-thematic and interdisciplinary work in schools, training and studies
- Counter marketisation tendencies; discuss factors that promote marketisation and eliminate if necessary (reduce PISA study focus on STEM subjects)

Links to other trend themes



Literature

[1] Autorengruppe Bildungsberichterstattung, 2014. Bildung in Deutschland 2014. Ein indikatorengestützter Bericht mit einer Analyse zur Bildung von Menschen mit Behinderungen. Bertelsmann Verlag, Bielefeld.

[2] Schnitzlein, Daniel, 2011. How important is the family? Evidence from sibling correlations in permanent earnings in the United States, Germany, and Denmark. SOEPpapers Nr. 365, DIW Berlin.

[3] Bundesministerium für Bildung und Forschung, 2014. Berufsbildungsbericht 2014.

[4] Statistisches Bundesamt, 2013. Berufliche Bildung. URL https://www.destatis.de/DE/ZahlenFakten/GesellschaftStaat/BildungForschungKultur/BeruflicheBildung/BeruflicheBildung.html, retrieved on 30.07.2014.

[5] Bundesministerium für Bildung und Forschung, 2012. Berufsbildungsbericht 2012.

[6] Statistisches Bundesamt, 2014. Bildung und Kultur. Nichtmonetäre hochschulstatistische Kennzahlen. 1980–2012. Fachserie 11 Reihe 4.3.1. Wiesbaden.

[7] Kuenheim, Eberhard von, 2011. Wider die Ökonomisierung der Bildung. URL http://www.faz.net/frankfurter-allgemeine-zeitung/natur-und-wissenschaft/wider-die-oekonomisierung-der-bildung-1627378.html, retrieved on 30.07.2014.

[8] Krautz, Jochen 2007. Pädagogik unter dem Druck der Ökonomisierung. Zum Hintergrund von Standards, Kompetenzen und Modulen. In: Pädagogische Rundschau 1/2007, 81–93.

[9] Kaube, Jürgen, 2014. Vom Unsinn ewiger Bildungsreformen. URL http://www.faz.net/aktuell/feuilleton/forschung-und-lehre/pisa-schulpolitik-vom-unsinn-ewiger-bildungsreformen-12934354-p2.html, retrieved on 30.07.2014.

[10] For example: „Marburger Bildungsaufruf: Demokratisierung statt Ökonomisierung. Schulen sind keine Wirtschaftsun-ternehmen." URL https://www.openpetition.de/petition/online/marburger-bildungsaufruf-demokratisierung-statt-oekonomisierung; retrieved on 30.07.2014. Gesellschaft für Bildung und Wissen e.V., 2014. „Nein zu Pisa (Offener Brief an Andreas Schleicher)" URL http://bildung-wissen.eu/fachbeitraege/nein-zu-pisa-offener-brief-an-andreas-schleicher.html, retrieved on 30.07.2014.

[11] Bruckner, Johanna, 2013. „Wir fördern gut ausgebildete Ungebildete". URL http://www.sueddeutsche.de/bildung/bildungskritiker-bernhard-heinzlmaier-wir-foerdern-gut-ausgebildete-ungebildete-1.1716852, retrieved on 30.07.2014.

[12] Krautz, Jochen, 2007. Ware Bildung. Schule und Universität unter dem Diktat der Ökonomie. Kreuzlingen/München 2007.

[13] Statistisches Bundesamt, 2010. Bildung und Kultur. Finanzen der Hochschulen. 2010. Fachserie 11 Reihe 4.5.

[14] Persönliche Interviews im Rahmen des SimRess-Projekts, April 2014.

[15] BMBF, 2010. Weiterbildungsverhalten in Deutschland. AES 2010 Trendbericht.

[16] Meadows, Donella, 2010. Die Grenzen des Denkens: Wie wir sie mit System erkennen und überwinden können, Oekom Verlag.

[17] SimRess Workshop.

[18] Edubuntu, 2014.

[19] Wikipedia, 2014. Liste von Lernplattformen. URL http://de.wikipedia.org/wiki/Liste_von_Lernplattformen, retrieved on 31.07.2014.

[20] Wikipedia, 2014. Wikipedia. URL http://de.wikipedia.org/wiki/Wikipedia, retrieved on 31.07.2014.

[21] http://www.zeit.de/2013/12/MOOC-Onlinekurse-Universitaeten

[22] https://www.edx.org/

[23] https://www.coursera.org/

[24] The Chronicle of Higher Education, 2013. The Professors Who Make the MOOCs. URL http://chronicle.com/article/The-Professors-Behind-the-MOOC/137905/#id=overview, retrieved on 31.07.2014.

[25] https://www.khanacademy.org/

4 Cooperation and interaction of trends

An example discourse based on three trend clusters

The trend themes researched in this report are made up of over 300 identified individual trends. The individual trends mutually influence one another. An unexpected development of an individual trend can cause a chain reaction of changes among other trends. In order to explore possible interactions and links between the individual trends, they must be analytically connected together. While combining each individual trend can create an unmanageable amount of complexity, an excessive culling of individual trends results in an incomplete or incorrect understanding of the overall trend. Therefore, individual trends were selected – based on source analysis, interviews and workshop discussions – such that they were assessed, in particular, for possible interactions. The individual trends originate mainly from themes that range from socio-economic acceleration to new modes of thought/world views and digitisation/networking, and also to a lesser extent, from urbanisation and (new) business models.

The first two trend themes are arranged more or less alongside one another: both trend themes describe the way we aspire to live and work. Many individual socio-economic acceleration trends are characteristic of the predominant growth-oriented economic model of capitalism. Some individual trends of this trend theme are new, but mostly they are "more of the same" at an accelerated speed. This labour and economic system has led to a high level of prosperity in Western societies, which many emerging and developing countries seek to achieve. At the same time, this model of profit maximisation and high consumption causes enormous environmental damage and consumption of resources, and also often leads to poor working conditions.[32]

There are many individual trends, including new modes of thought that have emerged as a result of criticism of this model and its negative impacts, particularly to the environment. This includes new individual trends as well as those which emerged decades ago. For example, permaculture and organic farming were developed in the seventies as a response to industrial agriculture.[33] Today, criticism of ecologically damaging economic activities[34] and the acceleration of everyday life is growing rapidly in response to climate change and environmental damage. As a result, new modes of thought and life models focused on deceleration, simpler living and well-being are becoming more important.[35]

The acceleration element of the two previously mentioned trend themes mainly emerges from digitisation and networking. Work processes are accelerating and product cycles are becoming shorter. Large amounts of money can be moved digitally within seconds; two-thirds of all stock trading is now done by computers, which can perform transactions within milliseconds and exploit tiny price differences.[36] However, new modes of thought, for example, in the form of transition initiatives, have experienced a boom as a direct result of digitisation and networking: groups come together over the Internet, knowledge is shared, bartering is organised and sustainable products and companies to find their niche.

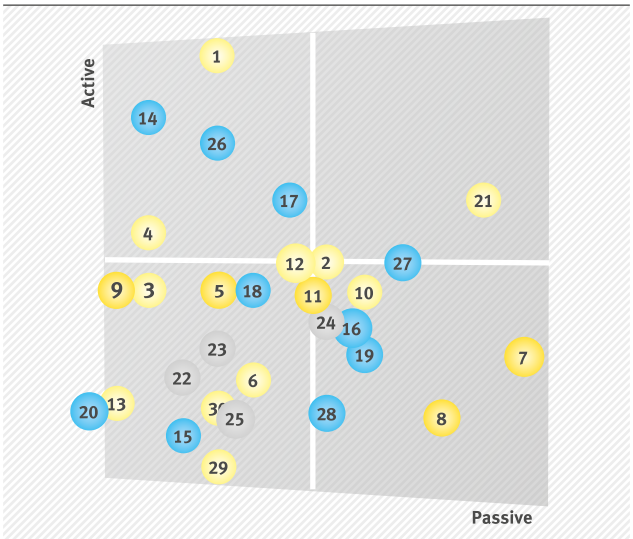
How the individual trends of these three trend themes interact with one another and what inter-related effects exist will be examined in more detail below. Due to the wide scope of the socio-economic acceleration and new modes of thought, only the most important individual trends associated to the theme were considered. "Important" are here the individual trends most frequently linked with other individual trends and driving trends. The complex network of all individual trends was reduced to 30 individual trends. The individual trends selected were summarised into three comprehensive, condensed trend

32 | Herrmann, Ulrike, 2013. Der Sieg des Kapitals. Wie der Reichtum in die Welt kam: Die Geschichte von Wachstum, Geld und Krisen. Westend Verlag, Frankfurt/Main.
33 | Mollison, Bill/ Homgren, David, 1984. Permakultur: Landwirtschaft und Siedlungen in Harmonie mit der Natur. Pala-Verlag.
34 | Hopkins, Rob, 2008: The Transition Handbook: From Oil Dependency to Local Resilience. Green Books, Totnes, Devon.
35 | Transition Network, 2013. Map of current transitions initiatives & potential founders. URL http://www.transition-initiativen.de/page/karte-transition-inis, retrieved on 07.07.2014.
36 | Lanchester, John, 2014. Der Super-Klick. Wie Hochfrequenzhandel funktioniert. In: Le Monde diplomatique (Deutsche Ausgabe), Internationale Beilage der tageszeitung Juli 2014.

Figure 1

Active-passive diagram of the 30 trends selected

Nr.	Description of trend
1	Focus on economic growth
2	Spread of Western production/consumption pattern
3	Multi-national corporations (MNCs) influence policy/lobbyism
4	Marketisation of the educational system
5	Immaterial wealth, participation
6	Sustainability, renunciation as life model
7	Criticism of the success of the Western model
8	Opposition to environmentally and socially harmful economic activities
9	Sustainability in eduation
10	Increased consumption of resources, environmental damage, emissions
11	More free time, less activities with a high consumption of resources
12	Personalised advertising, recording, survelliance
13	Increase in urban consumption and behaviour patterns
14	Advancing automation of industry
15	Increase in the number of ICT jobs
16	Increase of social platforms (DaWanda)
17	Increased pace of innovation
18	High frequency of hardware replacement
19	Rebound effects created due to efficient technologies
20	Virtual media replaces hardware
21	Business model focus on growth and profit
22	Increase in E-commerce



23	Acceleration of work processes
24	Development of individual and digital work environments
25	Simple solutions due to overtechnification
26	Digital life, reduced need of status
27	More technological application, higher resource requirements
28	Transparency promotes sustainability
29	Capital flow out of social structures
30	Compacted capital flows

clusters for analysis: acceleration of the capital- and economic system, sustainable life models and deceleration and digitisation and information flows.

In the first analysis, all plausible causal relationships of all 30 trends were identified in order to sort trends into the categories of active (driving) and passive (driven) trends within this causal structure. Figure 1 shows an active-passive diagram: the more a trend positively reinforces another trend, the higher it is located on the y-axis of the diagram; the more it is positively reinforced by other trends, the farther to the right of the x-axis it is.[37]

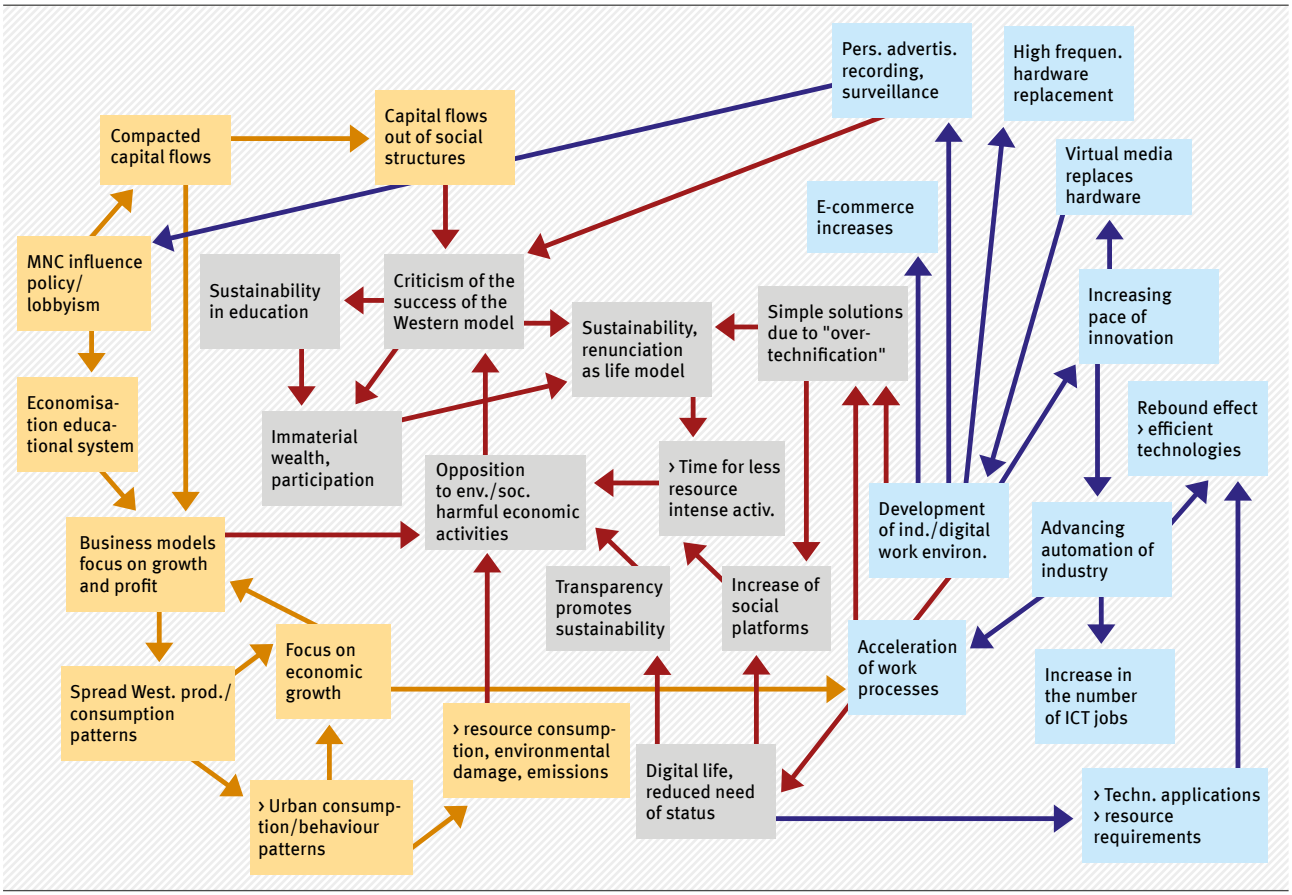
The most active trends can be seen in the upper quadrants of the active-passive diagram. They are marked orange in the table of trends. Of the 30 developments observed, these trends most affect the development of other trends within the system. These include many trends from the trend theme "socio-economic acceleration". This includes, for example, the spread of Western production and consumption patterns, in addition to the increase of business models that focus on profit maximisation, growth and an increased consumption of resources. An increasingly digital life is also, interestingly enough, among the most influential trends that result in a diminished need for material status symbols. Moreover, this phenomenon corresponds with a demised resource lifestyle.

The following diagram, Figure 2, shows relevant effects between individual trends within and between the selected trend clusters.

37 | A detailed description of the method used is presented in a separate document and is available upon request from the authors of the study.

Figure 2

Modes of action of 30 selected individual trends



Acceleration of capital and economic system trend cluster

Digitisation and information flows

Sustainable lifestyles and deceleration trend cluster

The arrows indicate an effect from the respective trend (and the associated trend cluster) out to other individual trends.

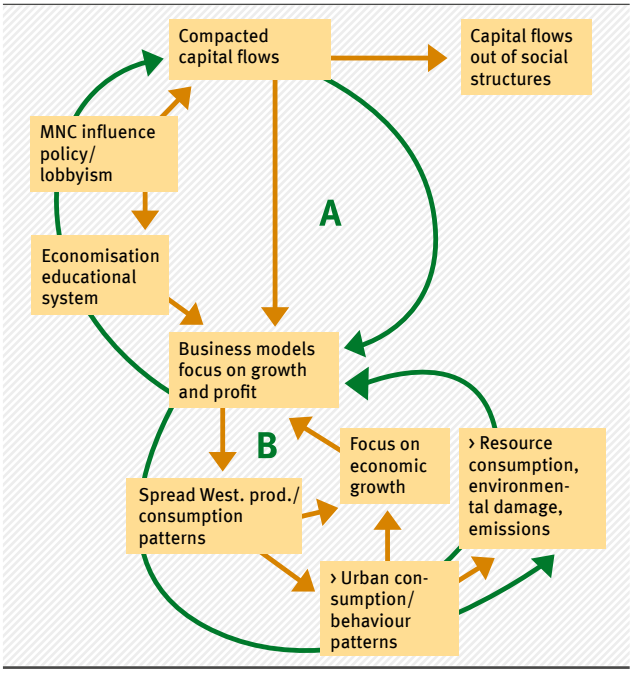
Trend cluster 1: Acceleration of capital and economic systems

The acceleration of capital and economic systems includes some of the strongest, or the most active, individual trends and largely determines the current working world and economic system. In the centre of the cluster is the growth and profit-oriented business model of many economic actors. The growth driven – and, thereby expansion-oriented – business model leads to the spread of Western production and consumption patterns. Increasing urban consumption and behaviour patterns continue to positively reinforce this focus on economic growth . Through its influence on business models that are aligned to maximise growth and profit, a feedback loop of mutually reinforcing trends is observed (see B in Figure 3).

Lobbying and economic influence on policy cause higher marketisation of the educational system and, due to the economic approaches and values taught during education, there is also a proliferation of business models that are based on growth and profit maximisation. In addition,

Figure 3

Feedback loops in acceleration of capital and economic systems trend cluster



the focus on these types of business models will likely cause a consolidation of capital flows as a direct result of lobbying (see Feedback Loop A).

The causal relationships and feedback loops mentioned show how individual trends of accelerated performance and profit-driven lifestyle and economy can influence one another. Though the causal relationship and feedback loops constitute a self-contained system they can accelerate the extent and significance of such an economy and lifestyle. One consequence is an increased consumption of resources due to resource-intensive production and consumption patterns.

Trend cluster 2: Sustainable lifestyles and deceleration

At the centre of the cluster is sustainable lifestyles (see Figure 4, Loop C). Sustainable lifestyles are formed by opposition to the growth-oriented capitalist economic system and criticism of ecologically and socially damaging economic activities. Alternative life models are being developed in response to this criticism. Sustainability and resource-conscious lifestyles are gaining importance in some social groups; sovereignty over the way in which time is spent and the intention behind activities are more important to these groups than material status symbols. The representatives of this group consciously choose low-impact, sustainable consumption and behaviour patterns. Such economic sovereignty in turn increases opposition to environmentally and socially damaging economic activities. The concept of sustainability can therefore increasingly be included in educational programmes, which will cause a long-term shift of society's set of values towards greater sustainability and deceleration. Many individual trends of the trend cluster "sustainable lifestyles and deceleration" are to a certain part a reaction to the individual trends of the trend cluster "acceleration of capital and economic systems".

Trend cluster 3: Digitisation and information flows

The emergence of digital and individual work environments is at the centre of the trend cluster labeled digitisation and information flows. Traditional training is less relevant in these work environments, and individual production methods that require less expertise and infrastructure are becoming more important.

In a self-reinforcing manner (see Figure 5, Loop D), these new working environments and modes of production cause an increase in the pace of innovation and lead to a progressive automation of industry. This, in turn, is characterised by a tendency towards virtualisation of businesses that include virtual work processes and increasing automation of knowledge services. In addition to possibly increasing the number of jobs in the ICT industry, automation also accelerates other phenomena of digitisation in the work environment.

Although the increase in virtual media and cloud computing can partially reduce the need for further use and development of hardware, it can be assumed that a technological improvement of resource efficiency will lead to rebound effects. At the same time, consumption of resources resulting from technical demand will rise due to increasing technologisation of work and living environments.

Figure 4

Feedback loops in sustainable lifestyles and deceleration trend cluster

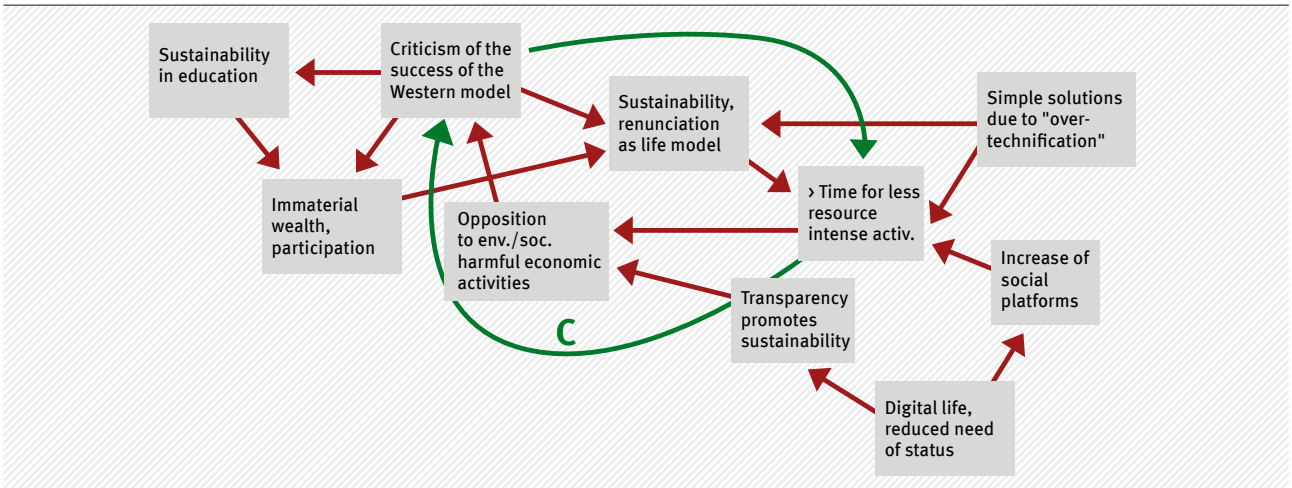


Figure 5

Feedback loops in digitisation and information flows trend cluster

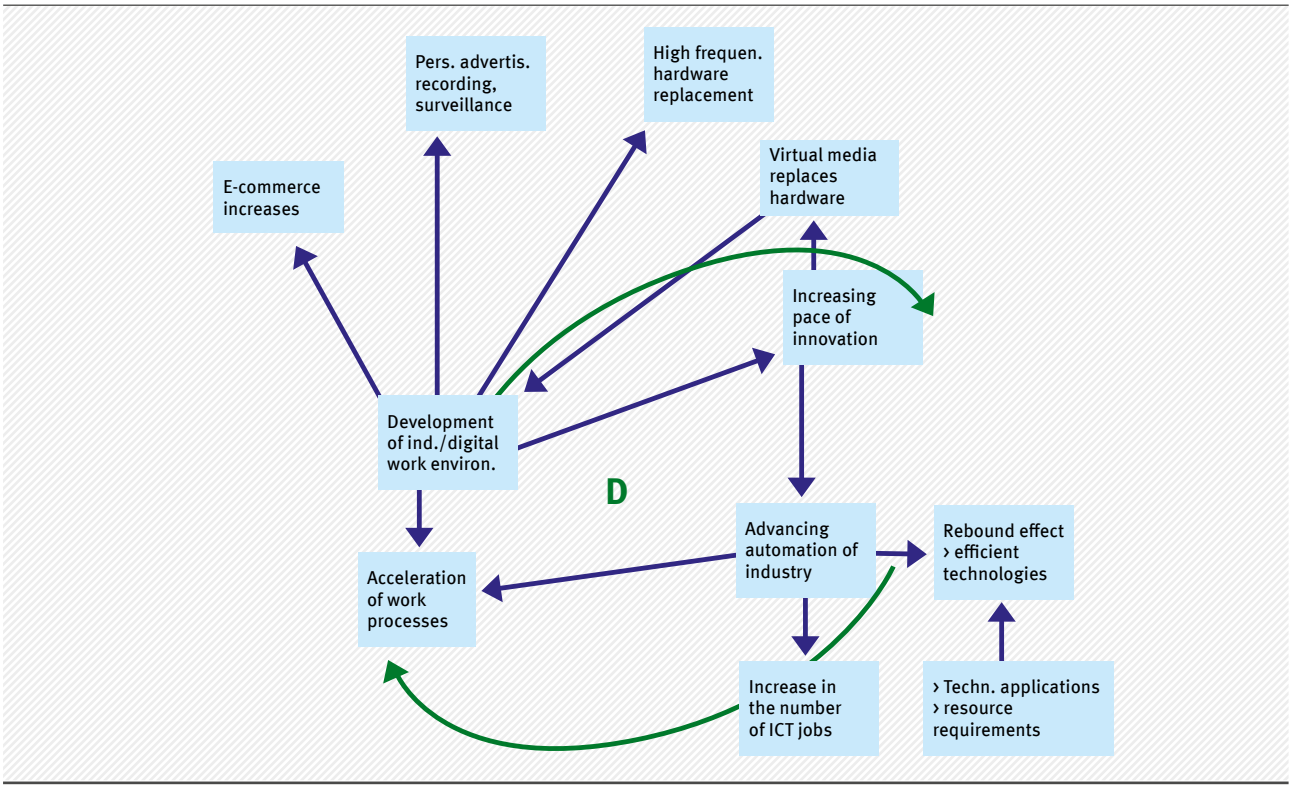
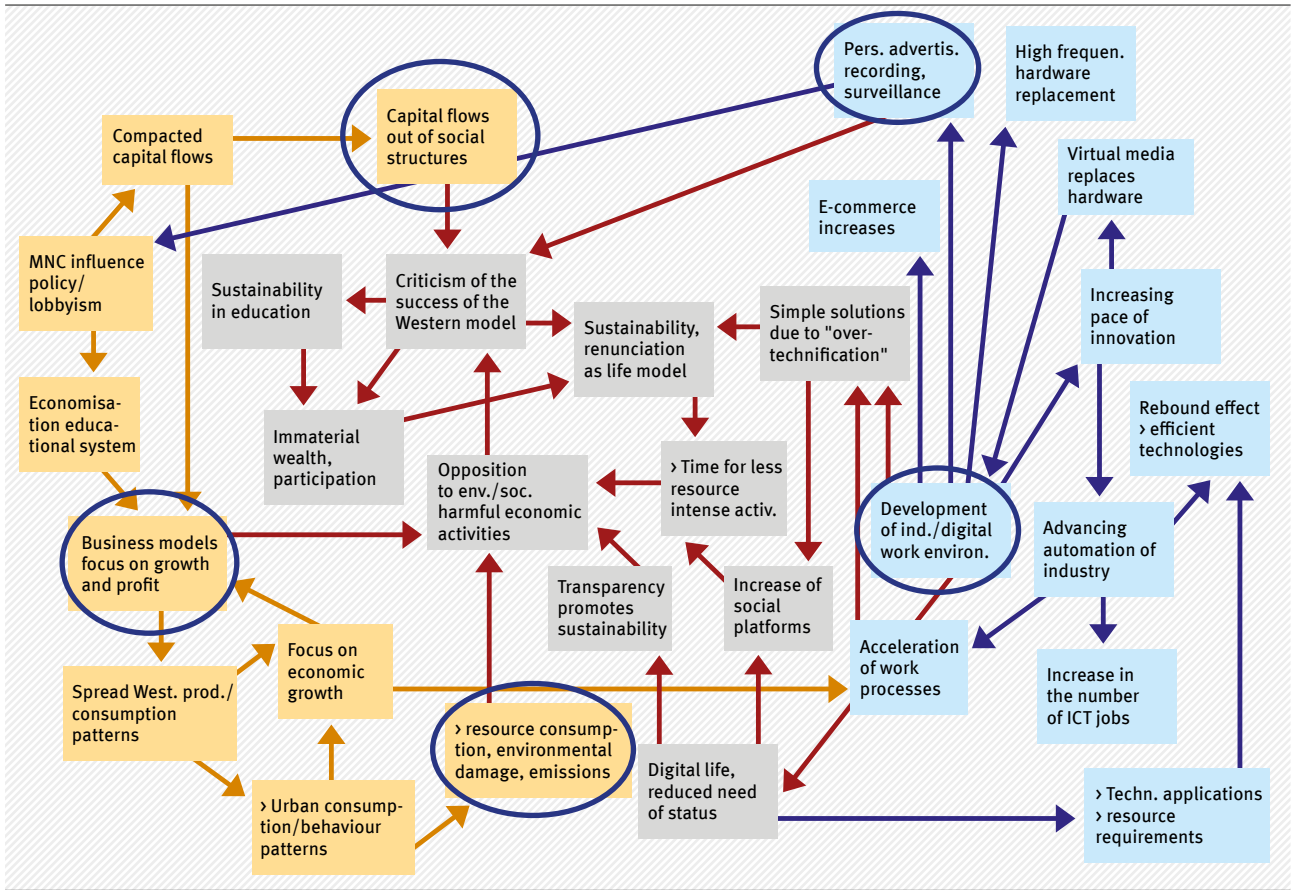


Figure 6

Potential effects of individual trends and their interactions on resource use



Potential effects of individual trends and their interactions on resource use

Of the three trend clusters, the acceleration of capital and economic systems cluster has a negative impact on the consumption of resource, due to an increase of production and consumption. While technological efficiency gains are likely due to accelerated innovation, they are often offset or even overcompensated by the increasing use of technology in the ICT sector, where rebound effects are likely to occur. More resource-conscious lifestyles of the individual trends in the sustainable lifestyles and deceleration trend cluster positively affect the consumption of resources; however, they still represent – in spite of their increasing importance – a niche phenomenon.

Various effects in the system are possible, depending on how the individual systems develop. Potential for an increase in resource efficiency may result from developments of individual trends, namely, the increasing generation of capital in financial markets. Such trends describe a development of increasing outflow of capital from social structures. Should this trend become stronger, it can lead to an increase in the criticism of the Western economic and lifestyle model and consequently contribute to or reinforce more sustainable lifestyles. Discussing questions about the "good life" – for example, discussions surrounding the luxury of time and immaterial wealth – may further positively reinforce its reach on larger social groups.

Similarly, an increasing spread of growth and profit maximisation based business models as well as the associated increased consumption of resources and environmental damage can lead to a growing opposition towards environmentally and socially harmful economic activities. A change in favour of sustainable development and deceleration-oriented lifestyles can occur.

Both trend clusters are further strengthened by digitisation and information flows. When digital, individual work and living environments are increasingly created, this can support transparency of products and their production. Information about the consumption of resources, etc. will be more accessible to consumers and can have an activating influence on further potential developments in the sustainable lifestyles trend cluster. Progressive digitisation may also create the desire for a simple, less high-tech life and enhance sustainable and decelerated lifestyles with less consumption of resources. In addition, for digital natives, material status symbols will lose importance without a conscious shift towards sustainable lifestyles.

5 ANNEX

List of participants

Nr.	Name	First Name	Institution
1	Ahlert	Gerd	GWS mbH
2	Bartsch	Golo	Planungsamt der Bundeswehr/Ecologic
3	Biebeler	Hendrik	Institut der deutschen Wirtschaft Köln IW
4	Bisch	Jürgen	Ex BayerMaterialScience AG;
5	Buhl	Jonathan	EUSG
6	Deilmann	Clemens	Leibniz-Institut für ökologische Raumentwicklung e.V. (IÖR)
7	Distelkamp	Martin	GWS mbH
8	Heinecke	Sabrina	Ecologic Institut
9	Hirschnitz-Garbers	Martin	Ecologic Institut
10	Koca	Deniz	Lund Universität
11	Lambert	Anne	Ecologic Institut
12	Langsdorf	Susanne	Ecologic Institut
13	Lorenz	Ullrich	Umweltbundesamt
14	Meßner	Christina	Verband der Automobilindustrie
15	Möller	Petra	GLS Bank Berlin
16	Rangnarsdottir	Vala	Universität Island
17	Ratzmann	Dörte	VDI ZRE
18	Rückert-John	Jana	ISINOVA
19	Schaldach	Rüdiger	Universität Kassel
20	Schüler-Hainsch	Eckhard	Daimler AG Research and Development
21	Sverdrup	Harald	Lund Universität
22	Taylor	Adrian	EUSG

List of interviewed institutions

Institution
Global Business Network
Hasso Plattner Institut, School of Design Thinking, Uni Potsdam
Institut für Beschäftigung und Employability IBE
Institute for Security Studies (ISS) South Africa
Institut für Zukunftsstudien und Technologiebewertung (IZT)
ScMI-AG
Strategic Foresight Initiative at the Atlantic Council of the US
Technische Hochschule Nürnberg Georg Simon Ohm
Transitionsinitative Nürnberg
Umweltbundesamt
Volkswagen AG
ZIRIUS
Z.Punkt

Ecologic Institute

Pfalzburger Str. 43–44
10717 Berlin
Phone: **030 86880-0**
Fax: **030 86880-100**
E-mail: **berlin@ecologic.eu**

www.ecologic.eu

Download as pdf
www.uba.de/publikationen/
zukunftsszenarien-nachhaltigkeit

www.facebook.com/umweltbundesamt.de
www.twitter.com/umweltbundesamt