

Megatrends and Sustainable Development

Megatrendy a rozwój zrównoważony

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Abstract

The last decades of the twentieth century and the beginning of the third millennium saw the significant acceleration of globalization processes, which has fundamentally changed and is still changing the world order and the face of the Earth. The qualitative changes that affect the nature of today's global economy require measures necessary for the adjustment to the reality and the specific nature of international relations. This is of particular importance for the principle of sustainable development, which depends on the on-going civilizational change largely shaped by the social expectations. Therefore, the analysis of megatrends in the future civilizational changes becomes essential in the context of the achievement of sustainable development, which is discussed in this article. The discussion focuses on the processes of urbanization, the development of air transport, public networking, institutional changes, and the environment, which have been identified as the key elements of civilizational change in the 2050 horizon, determining sustainable development in its economic, social, and environmental dimension.

Key words: sustainable development, megatrends, urbanization, transport, public networking, institutional changes, environment

Streszczenie

Znaczne przyspieszenie procesów globalizacji obserwowane w ostatnich dekadach XX wieku i na początku trzeciego tysiąclecia zasadniczo zmieniło i zmienia porządek i oblicze świata. Zaistniałe zmiany jakościowe wpływające na naturę współczesnej gospodarki światowej wymagają działań dostosowawczych do dzisiejszych realiów i specyfiki stosunków międzynarodowych. Ma to szczególne znaczenie w odniesieniu do zasady zrównoważonego rozwoju, której realizacja uwarunkowana jest zachodzącymi zmianami cywilizacyjnymi ukształtowanymi w dużym stopniu przez oczekiwania społeczne. W związku z tym istotą nabiera analiza megatrendów przyszłych zmian cywilizacyjnych w kontekście wprowadzania zrównoważonego rozwoju w życie, co stało się przedmiotem niniejszego artykułu. Rozważania skoncentrowano wokół procesów urbanizacji, rozwoju komunikacji lotniczej, usieciowienia społeczeństwa, zmian instytucjonalnych oraz środowiska, zidentyfikowanych jako główne czynniki zachodzących zmian cywilizacyjnych w perspektywie roku 2050 i warunkujące tym samym rozwój zrównoważony w wymiarze ekonomicznym, społecznym oraz środowiskowym.

Słowa kluczowe: megatrendy, rozwój zrównoważony, urbanizacja, transport, usieciowienie społeczeństwa, zmiany instytucjonalne, środowisko

Introduction

The future is a fundamental element of the sustainable development concept. This is clearly highlighted in the definition included in the Brundtland Report, where sustainable development is defined as *development that meets the needs of the present without compromising the ability of future generations to meet their own needs* (WCED, 1987). This definition suggests that civilizational changes should take into account not only of the present, but also of the needs of the generations to come. In addition, the key element of that concept is the fear of the environmental limits to growth (Meadows et al., 1972). What it means in practice is that we need to monitor and control the rate of consumption of natural resources so as to prevent their depletion. Those measures should be taken with due regard to the rules of social justice, and therefore should satisfy the needs of the poorest societies and, at the same time, reduce the consumption rate in highly developed countries (Dresner, 2002).

Past experience in the implementation of sustainable development leads us to the conclusion that the concept, on the one hand, is becoming a widely recognized political movement; but, at the same time, it seems to be nothing more than an empty slogan having very little in common with the reality of today's world (Pawłowski, 2010). True, we have been witnessing many attempts aimed at implementing the principle of sustainable development, especially as part of the EU energy and climate policy. However, those efforts look more like an attempt to find one's way in the dark rather than heading towards a pre-defined goal (Prandecki, 2011a). This is mainly due to the fact that the concept is very general and there is no set of universally applied measures to determine whether or not a given initiative is consistent with the underlying concept.

There is a large body of publications prescribing the implementation of sustainable development (*inter alia* Edwards, 2010; Korten, 2010; Jackson, 2009). They are usually limited to rather general messages suggesting the need to change the public approach to consumption and possession of material wealth. Those analyses present idealistic visions without considering the changes in today's world. Such an approach is their major weakness. Therefore, it seems only justified to analyze the current scenarios of the world's development and to determine whether it is at all possible to achieve sustainable development in the context of the expected megatrends.

The term *megatrends*, which was first used by J. Naisbitt, has been known since early 1980s (Naisbitt, 1982). However, despite a number of publications devoted to that concept (Naisbitt, Aburdene, 1990; Naisbitt, 1996), Naisbitt did not propose any definition of the term. As a result, it was interpreted quite

freely in the years that followed. Therefore, a number of different approaches can be found in the literature, and there is no generally accepted set of phenomena defined as megatrends, nor is there a set of qualities that should characterize that concept. Megatrends can include such general concepts as the waves of civilization described by A. Toffler (Toffler, 1982), as well as much more specific phenomena such as terrorism (Muszyński, 2001). In the present article, megatrends are understood as the global forces affecting the state, the market, and the society, acting many years in advance. In the context of sustainable development, the authors believe that the following phenomena will have the most significant impact in the coming decades:

- a) urbanization,
- b) development of air transport,
- c) public networking,
- d) institutional changes,
- e) growing pressure on the environment.

In addition to the above factors, there are a number of other significant civilizational changes. However, the authors decided to put the spotlight on the above phenomena, as they are highly dynamic and will have a significant impact in the future. As a result, the expansion of the world's population has been dealt with only marginally, while the consequences of changes resulting from urbanization processes were highlighted to a greater extent. That phenomenon is often overlooked in analyses, but it is as important for the consumption rate as the world's population growth. By the same token, the role of air transport was highlighted, while the most environmentally harmful mode of transport, i.e. road transport, was omitted in the article. Air transport develops much more dynamically and is also more significant as a driver for global change.

For the same reason, the article focuses on changes resulting from the ever-increasing access to the Internet. In addition, as the entities operating in today's global economy are becoming ever more interconnected, there is a need to develop certain institutional solutions at the regional and global level adjusted to the present and future reality, in the context of both megatrends and sustainable development.

Of all the above considerations, the environmental aspect is the one that is least obvious. The ever-increasing pressure on the environment is beyond any doubt, but it is a consequence of changes occurring in the areas discussed above. Therefore, it is difficult to treat it as a separate megatrend. Still, the authors decided to discuss it separately in order to emphasize the environmental impacts of the changes that are taking place in today's world.

Urbanization

The consequences of the world's population growth have been widely discussed. The problem was high-

lighted already in the eighteenth century by T. Malthus. It is estimated that the world's population will exceed 9 billion by mid-century (United Nations, 2011), and additional two million people will need more water, food, land, and other resources. However, the consumption needs of the world's population will be multiplied by the process of urbanization. This process has been unfolding gradually for the past three centuries. It was triggered by the industrial revolution in the second half of the seventeenth century, and gained momentum since the second half of the twentieth century. Back in 1900, only 13-14 per cent of the world's population lived in towns or cities, but already in 1930 that number reached 30 percent. Since then, in less than one century, half of the world's population moved to urban areas to reach 50 percent in 2008. That trend is expected to continue; according to the United Nations' forecasts, 70 percent of the world's population, i.e. about 6.4 billion people, will live in towns or cities in 2050.

That direction is clearly visible in a number of countries. In 2010, the following countries recorded the urban population index exceeding the UN forecasts: Belarus (75%), Belgium (97%), Brazil (87%), the Czech Republic (74%), France (85%), South Korea (83%), Libya (78%), Germany (74%), Russia (73%), the USA (82%), Sweden (85%), Switzerland (74%), and the UK (80%) (CIA, The World Factbook, 10.09.12). It should be noted that the above list does not include the so-called *city-states*. Poland, with the urban population index of just over 60 percent, falls behind the highly urbanized countries.

Dynamic urbanization processes are particularly visible in fast-developing countries, one example being the People's Republic of China. Back in 1978, only 18 percent of China's population lived in towns or cities, but in 2011 that number exceeded 51 percent. The high pace of urbanization in China and in Southeast Asia is expected to continue in the future. A similar phenomenon is expected in the Middle East and in Africa.

The urbanization rate will grow mainly in large population centers, i.e. metropolises and megacities. In particular, it can be observed in megacities with the population exceeding 5 million or in conurbations with the population exceeding 8 million. In 2011, there were 41 such population centers, mainly located in Asia (20 biggest megacities are listed in Table 1). According to Airbus, their number will reach 92 in 2031 (*Global Market Forecast*, 2012). They are still expected to be located mainly in Asia (Table 2).

In the twenty-first century, cities (especially metropolises and megacities), will not only be the places where the majority of the world's population will live, but they will also play a major role in the future development of the world. With income above average, easier jobs (usually without placing much burden on health), multiplied consumption of products

and services, and better access to culture, living in a city seems to offer the improved quality of life. Cities are also characterized by enormous dynamics of growth, productivity, and business innovations. Major academic, research and scientific centers are located in cities, and they are usually major centers for the industry and the provision of services. Some cities are also big financial centers, such as New York, Shanghai, or Tokyo. Such megacities offer great conditions for the creation of new jobs, both in the industry and service provision sectors, and are major drivers of rapid economic growth. Unemployment rates in big cities are low. With their size alone, they create great opportunities to attract foreign investments.

Table 1. Cities with a total population exceeding 10 million. Source: own study based on CIA: *The World Factbook* (10.09.12), data for 2009.

No.	City	Country	Population (in mln)
1.	Tokyo	Japan	36.507
2.	Delhi	India	21.72
3.	São Paulo	Brazil	19.96
4.	Mumbai	India	19.695
5.	Mexico City	Mexico	19.319
6.	New York-Newark	USA	19.3
7.	Shanghai	China	16.575
8.	Kolkata (Calcutta)	India	15.294
9.	Dhaka	Bangladesh	14.251
10.	Karachi	Pakistan	13.125
11.	Buenos Aires	Argentina	12.998
12.	Los Angeles-Long Beach-Santa Ana	USA	12.675
13.	Beijing	China	12.214
14.	Rio de Janeiro	Brazil	11.836
15.	Manila	Philippines	11.449
16.	Osaka-Kobe	Japan	11.325
17.	Cairo	Egypt	10.902
18.	Moscow	Russia	10.523
19.	Istanbul	Turkey	10.378
20.	Lagos	Nigeria	10.203

On the other hand, life in a city is faster, it consumes more resources (especially energy), longer communication routes are necessary, there is more exposure to noise, the natural day-night cycle is disrupted, and the increase in population causes social changes, making people less interested in the affairs of their local community.

As far as the social and environmental aspects of sustainable development are concerned, it is obvious that today's cities do not go in that direction. There have been attempts at building cities that meet the requirements of sustainable development, but they were limited to smaller cities. Given the rate at which that concept is spreading, no radical changes can be expected in that area.

Areas of poverty and deprivation, or *hidden cities* as the UN calls them, are an inherent element of megacities. Those areas are controlled by organized cri-

Table 2. Most dynamic cities (megacities) in 2025. Source: *Urban World: Cities and the rise of the Consuming Class*, McKinsey Global Institute, <http://www.mckinsey.com/mgi>.

City	Country	Population (in millions)		GDP in USD (\$) billions			
		2010	2025	2010 (in billions)	2025 (in billions)	Total growth	Growth in %
1. Shanghai	China	22.3	30.9	250.7	1112.2	861.5	344 %
2. Beijing	China	18.8	29.6	206.2	1027.9	821.7	398 %
3. Tianjin	China	11.1	15.2	128.8	624.4	495.7	385 %
4. São Paulo	Brazil	19.7	23.2	437.3	912.9	475.7	109 %
5. Guangzhou	China	11.1	14.9	146.1	573.0	426.9	292 %
6. Shenzhen	China	10.4	13.7	141.5	523.6	382.1	270 %
7. New York	USA	18.9	19.7	1180.3	1553.1	372.7	32 %
8. Chongqing	China	15.7	19.4	88.6	458.6	370.0	418 %
9. Moscow	Russia	11.6	12.7	325.8	688.5	362.7	111 %
10. Tokyo	Japan	36.4	36.7	1874.7	2218.6	343.9	18 %

minal groups involved in drug dealing and prostitution, and their rape and murder rates are very high. As a result, the social gap is growing and the number of socially excluded people is rising.

Air transport

Cities are not only human settlements; they are also gigantic gateways for business. This is most visible in the case of ports with large container terminals. More than 90 percent of all goods are transported in such containers. In 2009, there were more than 4.6 thousand container ships with about 29 million containers; in 2008, they transported about 500 million containers (until the outbreak of the global financial crisis). By 2025, the volume of goods handled in container terminals will increase by about 2.5 times compared to today's volumes. However, it is air transport that will trigger the most significant changes on a global scale.

Large airports handle the traffic of millions of passengers on numerous routes and certain types of cargo traffic (including electronics and perishable goods). We can already distinguish between cities that have large airports and those that do not; in the future, the former will develop more quickly than the latter. Further development of cities, economic growth, and societies becoming richer, especially in Asia, will be the key drivers of air traffic growth, and will stimulate the economy as a whole.

Large passenger traffic between megacities will depend especially on the airplane fleet that includes the biggest, wide-body long-haul passenger aircraft (VLA – Very Large Aircraft), such as Airbus A380 Superjumbo or Boeing 747 Jumbo Jet. They are used for long-haul flights and can carry as many as 853 passengers.

The growth in air transport is such that it should be considered a megatrend in its own right. Since 1970, the number of passengers doubled every 15 years. Deregulation of air traffic in the USA, which started back in 1977, had a major impact on its growth. The number of flights went up, while ticket prices went

down. In 2011, regular airlines carried 2,738 million passengers on scheduled flights (2,681 million in 2010) and 51.4 million tonnes of cargo, which represented the air transport performance of 5.2 trillion revenue passenger-kilometers (RPK) and 181 billion revenue tonne-kilometers (RTK). Compared to 2010, the transport of passengers went up by 5.6 percent, while the transport of cargo remained at almost the same level (Litwiński, 2012c). Airports all around the world handled the traffic of 5.1 billion passengers, and aircraft carried 88 million tonnes of cargo, with 70 million take-off and landing operations. The highest growth was recorded by airports in South America and the Middle East (Litwiński, 2012b). This represents a major step forward compared to the past. Back in 1977, there were about 290 regular airlines in operation, with about 6,500 jets in service. In 2011, more than 900 airlines were in operation and the number of airplanes reached 19,890 (*Current Market Outlook*, 2012). In the next 20 years, the number of passenger and cargo aircraft will double (Table 3). In 2031, 39,780 jets are expected to be in service, including 36,580 passenger aircraft and 3,200 cargo aircraft. In addition, the average capacity of passenger aircraft will increase by about 20-25 percent.

Table 3. Passenger and cargo jet aircraft in service in 2011 and the forecast for 2031. Source: own study based on *Current Market Outlook*, Boeing Company, 2012.

Aircraft size	2011	2031
Very Large Aircraft (VLA): A380, Boeing 747	790	1030
Wide-body (twin-aisle) aircraft	3,710	9,110
Narrow-body (single-aisle) aircraft	12,610	27,430
Regional jets	2,780	2,210
Total	19,890	39,780

According to estimates prepared by Boeing analysts, the passenger transport performance will increase from 5.2 trillion revenue passenger-kilometers (RPK) in 2011 to 13.8 trillion RPK in 2031. The largest growth in air traffic is expected within North

America – 1,459.61 billion RPK (952.94 billion RPK in 2011), within China – 1,448.40 billion RPK (380.11 billion in 2011), within Europe – 1,305.30 billion RPK (659.48 billion in 2011), and between Europe and North America – 901.20 billion RPK (430.20 billion in 2011) (*Current Market Outlook*, 2012).

In the next 20 years, the global annual average economic growth is expected to reach 3.2 percent (of which 5.0 percent in developing countries and 2.0 percent in developed countries), which will entail the related growth in the airplane fleet by 3.5 percent per annum, and an increase in transport performance of 4.0 percent for passenger traffic and 5.2 percent for cargo traffic (*Current Market Outlook*, 2012). In comparison, the Airbus forecast for 2012-2031 expects the annual growth of 4.7 percent for passenger traffic and 4.9 percent for cargo traffic, which means that the number of passengers will increase from about 3 billion in 2011 to 7.5 billion in 2031 (*Global Market Forecast 2012-2031*).

Transport, in particular transport by road, is one of the key sources of pollution, which means that it has a major environmental footprint. However, in the context of sustainable development, air transport is much more important. The most significant effect of air transport is the flow of ideas. Despite global networking, most artistic creations and inventions still result from direct contacts. J. Naisbitt referred to that phenomenon as *high touch* (Naisbitt, Philips, 1999). Air transport allows for the integration of different groups, which, on the one hand, increases the flow rate of ideas such as fashion, but also the awareness of threats to the environment. The impact of airlines on the flow of information and knowledge cannot be expressed in quantitative terms. But it cannot be disregarded on those grounds. The current direction of changes can be considered unfavorable. In addition to the negative impact on the environment, the social effects of communication lead to globalization in the social dimension. Unfortunately, it is based on Western consumption patterns, and developing countries tend to copy those patterns without any second thought. As a result, the impact of air transport on sustainable development will be much higher than the environmental costs attributable to all the remaining modes of transport.

The network society

It is not easy to answer the question what the world will look like in 2050 as a result of the emergence of the network society, and how the society itself will change. The reason is (Morawski, 2010) the number of the unknowns (as we do not know the limits of expansion of the cyberspace yet) and the interactions between them (new global configurations).

In addition to the currently recognized global megatrends, new paradigms need to be found to meet the challenges of the changes which the global society is

undergoing. One such paradigm may be based on the potential of the global network society, or global networking.

Networking offers unique opportunities for cooperation, even if the world prefers the competition model (Zacher, 2012), which is mainly due to the fact that people tend to focus on their own interests, especially in terms of business. On the other hand, networking offers a global network in the cyberspace, including global network communities such as Facebook, which currently has more than 1 billion users – or rather participants. We are living in the network society, but the nature of the future social relations will depend not only on the technical characteristics of the network itself, but also on the dynamics of changes in our social reality, as a derivative of the related social processes such as the ageing of societies, population growth, depletion of natural resources, global migrations, etc. (Chimiak, Fronia 2012).

Global networking may become useful for the processes of management of social changes, including their dynamics and unpredictability, but if there is no clearly dominant paradigm determining the criteria, characteristics, or principles of the so-defined *global governance*, it will be necessary to develop an overriding principle, taking precedence over the mechanisms of cooperation, competition, interdependence, or domination, which will be used and established in the future. That principle may be the care for the common good – i.e. the Earth's remaining natural resources that are becoming scarcer. But it may also be any particular interest of a dominant player, or a further increase in enormous consumption, or smaller regional and local interests.

In line with those processes, the global architecture of the current institutional system will also change. The institutionalization of the efforts taken to prevent the negative effects of climate changes is a sign indicating the current trends (Fronia, 2011). The failure and inefficiency of the so-called *climate summits* triggered efforts taken on a smaller scale (Fronia, 2010). The criterion underlying the network cooperation was not related only to geographic location, political system, or stage of development, but primarily to the overriding objective, i.e. the prevention of negative effects of climate changes. However, there are other, less positive aspects of the ever-growing networking dimension of institutional cooperation. First of all, it is less permanent than, for example, the former system of cooperation within the United Nations; it often happens on an ad-hoc basis and is usually related to specific matters which are considered significant for a given group of countries or for other international players (The mixed interdependencies between national and non-national players on a global level are another problem. Both types play a major role in the international arena, and their mutual relations are becoming ever more complex).

Using the potential of the ever-growing global interdependence between the entities participating in the information exchange network, the cooperation between them, decision-making processes, and taking decisions on the direction of changes regarding the development of the specific forms of that cooperation, will influence the quality and stability of the local systems. At the lowest level, it will be important for the functioning of local communities. For instance, the prevention of conflicts arising from the scarcity of drinking water in the areas most affected by that problem will consist essentially in looking for ways to meet the challenges faced by the inhabitants of the most water-stressed regions. Considering the type of that problem, such conflicts will be managed more at the level of cooperation within a network of global interdependencies.

Those activities may take the form of empowerment (as in the case of a number of social movements) or instrumentalization (as in the case of most business activities, be it in the form of transnational corporations or in any other form, also including non-organized crime). They may also foster the development of knowledge (cooperation between scientific groups all around the world, or the Open Access initiative).

From that perspective, activities such as the anti-ACTA movement, or protests in Tahrir Square in Egypt, which led to political changes, may be the signals of the future forms of functioning of the global network society. As Castells (2012) points out, the use of state-of-the-art technologies is only a vehicle for more serious social processes. The contradictions and conflicts in certain societies will be the driver of changes in the future. Their proper interpretation over the course of the next 40 years will therefore depend on the adoption of an overriding principle of *global governance* as part of the international interdependencies based on networking, which will reduce the risk of occurrence of a global disaster, prevent the humanitarian, political and economic crises, and mitigate the risk of transnational conflicts (Fronia 2011; Fronia 2008).

Based on the above arguments, we believe that, in the context of sustainable development, public networking should be treated as an opportunity, not a threat. Network societies are more aware of the active role of an individual in the society. Just like in the cases described above, we can expect that the awareness of certain threats will lead to the integration of the interested persons. At first, those initiatives will be related to individual events only. But in the long run, we can expect a more extensive cooperation for the purpose of implementing the overall concept.

The institutional dimension

In addition to the question of public networking, the changes and challenges in the institutional dimension are related also to the economy in a broader sense, which is the outcome of the processes manifested in the intensification of global interactions, elimination of geographic barriers in the flow of goods, capital, services, technologies, information, and ideologies, the development of mass culture, and more intensive economic relations, both bilateral and multilateral. It all has increased the interdependencies between individual entities participating in the international exchange, emphasizing the very essence of cooperation and leading to the transformation of the world's economy into an integrated system of markets, and, as a consequence, to the evolution and change of the very nature of international relations (Liberska, 2002; Zorska, 2002; Akyüz, 2003; Stiglitz, 2004; Nawrot, 2008). In the future, those phenomena are expected to continue or even become more intensive. Their consequences will be of particular importance to the environmental aspects of sustainable development. Globalization, combined with social changes, will boost consumption, which will also increase the volume of international trade and the resulting pressure on the environment, with growing demand for resources and the ever-increasing emissions of pollutants and waste.

Despite the financial crisis, liberalization is still the prevailing trend in the global economy. In the present decade, we cannot expect any strong global tendencies pushing for a change in the opposite direction. That trend may be expected to continue also in the longer perspective. This means that the current models of economic development based on the growth in GDP will be maintained. That trend is against the concept of sustainable development, which calls for the dematerialization of consumption. Many researchers focusing on sustainable development do not criticize capitalism as a market system as such, but they want to restore the fundamental principles of capitalism underlying the classical economic theory, which also include the social and ethical contexts, as the indispensable elements for the functioning of capitalism to the benefit of the entire society. As J. Ikerd points out, sustainable development will depend on the awareness that the world is a single ecosystem of which we, humans, are an integral part (Ikerd, 2008).

The qualitative changes pose new challenges also in the institutional dimension, which require measures necessary for the adjustment to the reality and the specific nature of international relations, with a view to guaranteeing proper conditions for sustainable development. At the same time, we should point out that the goal of the economic activity or competition between individual players in the global economy has not changed in itself, that goal still being to ensure growth, social welfare, or the broadly defined

quality of life. What has changed significantly, and will continue to change very dynamically, is the environment in which we are working to achieve that goal: from the family, social group, or nation, to the international or regional dimension, the entire global economic system, up to the universe as a whole (Nawrot, 2012a).

In this context, the United Nations Conference on Sustainable Development in Rio de Janeiro can be considered a breakthrough in the history of mankind, because it sanctioned the very concept of sustainable development (Pawłowski, 2009); at the same time, it is noted that measures must be taken not only in the economic dimension, but also in the social, environmental, or ethical dimension within which sustainable development is analyzed (Rydzewski, 2012; Pawłowski, 2009).

The increasing role of interdependencies and cooperation on the one hand, combined with the ever-increasing number and changing importance of players in international relations on the other hand, require new forms of collaboration and cooperation not only between countries, but also between other stakeholders in international relations. In addition to the state and the market, new entities are now actively participating in the development of the international institutional order. Those entities include enterprises, trans-national corporations, NGOs, national, regional and transnational expert bodies, organizations for regional cooperation and integration, or international and transnational cooperation networks. What must be noted is the changing role of the state as the dominant entity in international relations, and an alarming gap in the ability to take effective measures in the reality we live in. At the same time, there is certain reluctance to delegate the decision-making powers and privileges to regional or global institutions, for fear of losing sovereignty or surrendering a part of it. What is obvious is the lack of new, substitute mechanisms. In the light of the civilizational megatrends and the related challenges, despite the fears that the national economies might lose their sovereignty, the need for further institutionalization of the world's economic system is beyond any doubt, as this will prevent the social, economic, and environmental degradation. However, this process seems to be too complex to expect that global institutions able to achieve the objectives of *global governance* will emerge in less than twenty years. The failure of the Rio+20 conference of June 2012 is a good example. Expectations were high, but the conference failed to reach agreement as to the establishment of a permanent body for the environment and sustainable development within the structures of the United Nations. We can therefore expect that states, as sovereign entities functioning as permanent elements of the global structure, with their economic authorities elected on a more or less democratic basis, will still offer the main institutional framework within which other entities will organize themselves (Kleer, 2012;

Misala, 2009). This seems reasonable, because states are more capable of preventing internal and external disturbances (or shocks). The specific nature of today's global economy also justifies the activity within a group of states, both in the form of regional integration groups and supra-regional or global structures, provided that the interests of the majority of citizens of those states are as close as possible and the domination of the stronger over the weaker is eliminated to the greatest extent possible (Misala, 2009; Nawrot, 2012a).

In the global economy, the broadly defined instrumental and institutional conditions will therefore play a key role at the following levels:

- the global level,
- the regional level,
- the national economy level.

In those three dimensions, system-based solutions will interact with one another. However, the competition between national economies may pose a threat to the creation and functioning of the effective cooperation structures, because the entities operating in individual economic subsystems will strive to gain a competitive edge.

In that context, activities of the players in the global economy should lead to the achievement of sustainable development, treated as the overriding objective and the common interest of all citizens. The achievement of that objective in the context of institutional changes, and at the same time the ability to cope with the ongoing changes, to meet the challenges, and to eliminate the threats, will require multi-lateral involvement and good management of cooperation at different levels (Ocampo, 2010; Nawrot, 2012b). Management of the emerging interdependencies will consist in the effective governance of the cooperation networks in all the three dimensions listed above. This applies equally to the national or regional dimension and to *global governance*, which assumes the management of the global cooperation network. In addition, the public and private dimension must be taken into account, and different entities sharing the same values must cooperate and form partnerships. And lastly, multilateralism will require equal involvement of the individual entities operating in the global economic system. This applies in particular to the spatial dimension, where the activities of the EU and the USA must be complemented with the involvement of countries from the Asia-Pacific region (such as China, India, and certain ASEAN+ countries), and also other emerging markets from Latin America and Africa.

In the emerging network of bilateral and multilateral relations, arising from the participation in a number of regional, interregional, and transnational structures of different types, there are certain functions, tasks, or governance activities that will overlap or exclude one another; therefore, there is an urgent need to ensure coordination, both regionally and globally (Nawrot, 2012c).

Delegating certain powers and responsibilities to regional and global institutions cannot be avoided. In addition, there is also an urgent need to develop the optimum system of collaboration and cooperation, as well as the mutual relations and interdependencies among regional and global institutions, and to involve less developed regions in order to reduce the disparities between growth centers and remote regions and to eliminate the existing asymmetries. More effective *regional governance* will determine the quality of governance at the global level, and the existing gap between ongoing processes and the current adjustment, supervisory, or control mechanisms will require coordinated efforts and compatibility of the regional policy and *global governance* (Nawrot, 2012c; Nawrot, 2012d).

The new economic and political reality will require cooperation at the supra-regional level with a view to:

- stabilizing financial markets,
- achieving macroeconomic stability,
- financing development, including in relation to the social dimension, infrastructure, energy, and the environment,
- protecting the environment,
- managing the disaster risk,
- cooperating at the level of research centers, such as institutes, think-tanks, and universities.

The coordinated activity in the above areas will foster sustainable development, and the experience of countries affected by the financial crisis of the first decade of the twenty-first century shows that instability in one area will undermine all three dimensions of sustainable development: economic, social, and environmental (Akyüz, 2012).

The environment

Environmental aspects are among the most significant aspects in the long-term analysis of civilizational development. The problem of limits to growth, which result from the scarcity of resources, was analyzed by many researchers (Meadows et al., 1972; Turner, 2008; Randers, 2012). Three main threats related to the natural environment may be determined on that basis. These include: climate changes, loss of biodiversity, and inefficient use of natural resources. However, that list is not exhaustive, because in many cases other threats can be highlighted – for instance, interference with the global nitrogen cycle, ocean acidification, etc. (Rockström et al., 2009).

According to the media, climate change is the single most important environmental problem. Considering the high degree of complexity and interactions between different variables, any forecasts in that area are highly uncertain. Based on the available data we can expect global warming caused by the rising greenhouse gas emissions in the future. The expected

rise in temperature will affect different areas to a different extent; as a result, certain societies will see it as a major problem, while others will welcome it as an opportunity for growth (Starkel, Kundzewicz, 2008). Most states and international organizations emphasize the need to fight climate changes in their official positions. However, the effects of measures taken to date are not too optimistic. This applies in particular to the failure of negotiations between parties of the climate convention with respect to the limits on greenhouse gas emissions after 2012. Global initiatives can be expected after 2020 at the earliest, which means that we have lost an entire decade. As the global financial crisis is spreading and greenhouse gas emissions are rising, we should not expect any reduction in the level of greenhouse gas pollution by 2030. This will further accelerate the above-mentioned changes, making it difficult to achieve the adopted objectives. Because climate changes are gradual, rather than being a sudden disaster, we can expect that a large group of stakeholders will still oppose any climate initiatives in 2030. As a result, it is difficult to predict any climate initiatives in the longer run.

The loss of biodiversity does not attract so much attention as climate change, but the rate of extinction of many species is appalling. It is claimed that what we are witnessing right now is nothing less than the sixth global extinction event. Unlike the previous mass extinctions, which were due to natural causes, the present extinction event is entirely man-made (Kozłowski, 2005). The present-day political and economic decisions do not offer a global solution to that problem. Even on a regional scale, where the environmental awareness is high (e.g. in the European Union), we cannot expect that those processes will be stopped. It seems that we will need a major damage with a direct impact on humans to finally realize that action is necessary. But the loss of biodiversity is an *invisible* process, making it difficult to highlight its effects. We can assume that the problem will deteriorate until 2050, but decisive measures for the protection of species will only be taken in the last decade of that period. This means that we can expect a serious depletion of plant and animal life, and the effects of that process are difficult to predict. It results from the tendency to classify species in terms of their usefulness for humans. However, such an approach is misleading, because the extinction of species that are considered *useless* may trigger the degradation of entire ecosystems and the subsequent extinction of the *useful* species.

Protection of biodiversity is discussed separately, but it is part of a broader notion of resource management. The business world usually focuses on the access to non-renewable resources, but renewables also deserve more attention (Nawrot, 2012e). In this area, three specific aspects can be discussed: the management of water, forests, and food supplies.

By 2050, we should expect no major changes in forest management. The current policy will probably be maintained, which means that no binding international agreements on the standards and levels of protection of forest ecosystems are to be expected any time soon. Considering the importance of forest resources for the global economy, the current trends in forest management are likely to continue. As a result, only Europe will see the further enlargement of its forest area, while in other continents the rate of deforestation (especially with respect to rainforests) will increase (Hayden, 2009). Until 2030, societies should not experience any negative effects of that policy, and only environmentalists will draw our attention to the scale of losses caused by the mass deforestation of rich ecosystems. It will also further reduce the world's biodiversity.

Many organizations are warning against the risk of insufficient food supply. The expected population growth, especially in poor countries, may lead to rapid expansion of high-poverty areas. In some parts of the world, for instance in China, those areas may be reduced locally. However, we can generally expect that on the global scale the number of people with limited access to food supplies is likely to increase. The main reason for that situation is not our inability to produce sufficient amounts of food, but rather the inefficient food distribution processes. The growing obesity epidemic in highly developed countries, where spending on food is not a major part of a household budget, and the scale on which food is wasted, only confirm that statement (Nazaruk, 2012). On the other hand, people in poor countries cannot afford to buy food at global prices, which reflect the reality of developed markets. It seems that this trend will continue, because we see no prospects for the development and application of new, more efficient food distribution processes.

Water management appears to be the biggest challenge for the future. Water pollution and the ever-growing problems with access to water (also caused by climate change) will be felt most sharply. Its impact will be gradual, but the rate of this process will still be the most dynamic of all the above processes. Its consequences are also most severe, because they will pose an immediate threat to human life.

According to the most recent estimates of the OECD, the mid-century will see a rise in demand for water by 55 percent compared to 2000. That increase will affect mainly the goods production sector (up by 400 percent), the energy sector (up by 140 percent), and the household sector (up by 130 percent). In addition, a major part of the world's population will still have problems with access to water and sanitation (Leflaive, 2012). It is not only physical access to water that is taken into account, but also the so-called *water poverty*, i.e. the technical and financial problems related to the extraction, transport, and distribution of water (*Access to Water in Developing*

Countries, 2002). Forecasts presented by The Millennium Project are much less optimistic, assuming that even half of the world's population could live in water-stressed areas (*Global Challenges Facing Humanity*, 2011).

Compared with the above problems, the aspects related to the depletion of non-renewable resources seem much more obvious. It is only logical that the use of the existing resources has its limits. Still, not many people are aware of the consequences of this process. Estimating the accessibility of specific resources involves a high risk of error, because it is not possible to determine, in a reliable manner, the size of currently available resources and to predict the size of resources that still remain to be discovered. As a result, the predictions relating to the depletion of those resources should be treated only as warnings, not as fixed dates.

Among non-renewables, energy raw materials (in particular crude oil and gas) are given primary attention. However, the focus needs to be shifted to other resources, mainly to rare earth elements. The estimated time limits for their availability are much shorter than for primary energy sources. In 2010, the availability of crude oil resources was estimated at over 46 years (BP, 2011). Estimates for other raw materials are much less optimistic (for instance, 9 years for silver or 13 years for zinc). Obviously, those estimates are not precise and vary greatly depending on the study. Therefore, they should be treated only as warnings. In practice, those studies do not include many less-known deposits, because there are no technologies currently available for their production on an industrial scale. This applies in particular to deposits located at great depths and in Arctic regions. However, the risk of depletion of some of those raw materials by 2050 is still very high. On top of that, most of them are indispensable for the proper functioning of electronic devices; this raises additional concerns. Most of them do not have any known substitutes and we do not know how to produce them in laboratory conditions. Therefore, the management of those resources should be given the highest priority. And there is one other source of concerns: it is the fact that 97 percent of the world's rare earth mineral trade is controlled by one country, China.

Concluding remarks

Without any doubt, the twenty-first century will differ greatly from the preceding centuries. With the scale and rapidity of the changes to come, the world in the future will bear little resemblance to the past. What will be important is the quality of those changes, based to a large extent on the life and work in cities, especially in megacities or metropolises. In addition, with a dense network of air and maritime transport links (as well as road and rail connections), both passengers and cargo will be moving very fast.

That progress will be based to a large extent on the latest Internet solutions, which will be related to the intensive digitalization of production.

The objective of sustainable development is to create such civilizational changes as to ensure that mankind can develop safely in the long run. This is of particular importance if we consider the environmental aspect, where the limits of the Earth's capacity are put into spotlight.

However, most consumers are so detached from the environment that they hardly even notice that every product is based on the use of raw materials. In the global economy, there is a conviction that there will always be someone in the world who is interested in the sale of certain goods, and so the market economy will continue to thrive. That trend leads to the rapid increase in consumption.

The growing demand for goods and services is a consequence of a number of mutually reinforcing factors. First of all, the world's population will continue to grow, exceeding 9 billion people by 2050. This means an increase by nearly 30 percent. Every new inhabitant of the Earth will need to satisfy at least his or her basic needs, which will have a considerable impact on the food supply, water resources, and the Earth's surface. Secondly, the increasing urbanization will put even more pressure on the environment. We can expect a further increase in air pollution (especially through greenhouse gas emissions) caused by the industry, the energy sector, and transport (mainly road and air transport) (Prandecki, 2010). We should also remember about additional difficulties, such as removal of waste in cities or commuting problems (rush-hour traffic jams). The supply of clean water to inhabitants and treatment of wastewater will also be the key factors.

The second factor of strategic importance for the proper functioning of cities will be the supply of electricity at affordable prices, which is necessary to maintain all life-supporting and occupational functions of the inhabitants. As the population grows, the demand for electricity in cities will also increase (Prandecki, 2011b).

And thirdly, the development of cities will further strengthen the consumption-based lifestyle, which results from the faster pace of life and more shallow contacts between people, who will be driven mainly by the desire to possess more.

All the above factors will increase the demand for goods and services. Those trends are expected to slow down only in the second half of the analyzed period. However, even at the regional level it is difficult to predict the functioning of sustainable areas. The planned transition to low-emission economies by 2050, e.g. in the EU and in China, may be considered a step in that direction. However, this will solve only part of the problems in the context of sustainable development. Since the adaptation of the institutional framework to the present reality is too slow, we should not expect any major changes in that area,

even despite such planned measures. Still, it is worth pointing out that a comprehensive institutional change could be one of the key drivers of sustainable development.

The idea of a network society is one factor that could reduce consumption and undermine the policy based on economic growth. The ongoing changes, especially those fostering the exchange of information and the involvement of individuals in public life, will lead to increased environmental awareness. However, this process will not be dynamic, because there are no clear indications that we are reaching any limits. The depletion of natural resources will be a slow and *invisible* process. It will only manifest itself in the rising prices of raw materials and finished goods. In many cases, it will not be associated with any environmental limits. Most probably, economic processes could be compared in the future to the current loss of biodiversity, which usually goes unnoticed for a long time, and warnings from experts are ignored by the society. Despite the difficulties in taking coordinated measures, both at a regional and global level, and very limited prospects for the establishment of a sustainable development institution meeting the *global governance* objectives in the nearest future, such efforts should be made.

In conclusion, the main idea of sustainable development should be the reduction of consumption (at least of material goods). This, however, is a long-term objective. For an average inhabitant of the Earth, the time-frame of several decades is too long; it is very unlikely that an average person would be willing to give up the satisfaction resulting from the use of the available resources for the sake of some future, uncertain benefits (Prandecki, 2011c). In addition, there are no clear and widely accepted quantitative methods for the evaluation whether or not a given initiative is consistent with the underlying concept (Russell, 2010). Megatrends analyzed based on the current behavior patterns indicate that the development of mankind goes in the opposite direction than the concept of sustainable development. Therefore, efforts focusing on the achievement of sustainable development should take into account the lack of public interest in taking real action. It seems that the only solution is a wide-ranging educational initiative, highlighting the need to promote the positive values (such as the common good) in the triangle economy-society-environment (Borys, 2010).

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