

# Globalisation as Reflexive Modernisation—Implications for S&T Governance



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## 1 Introduction

“Globalisation” refers to a process of growing interconnectedness of economies and affects trade relations, production chains and labour markets. However, globalisation is about more than economics. It includes significant socio-cultural changes, which induce as many challenges to policymaking and governance as the “global economy”. These changes are technologically fostered by increasing options for real-time exchange of data, news, money, chats, advertisements and videos about all kind of subjects, from everyday problems and individual preferences regarding fashion, to problems of international justice and socio-economic inequality or the global condition of our environment. The changes connected with these developments have repercussions on every citizen of the world. The effects will be different for each individual; some effects will be welcome, others may cause conflicts, social upheaval or crises, sometimes of a global nature such as global warming or the COVID-19 pandemic, each of which has specific local and personal consequences. Thus, globalisation changes our life world and through this our reference system for individual and political decision-making.

It is the purpose of this chapter to provide a frame for more specific contributions provided in this volume on governance issues in science and technology (S&T), and in particular the role of Technology Assessment (TA), by giving an overview

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Contribution to: Technology Assessment in a Globalised World—Facing the Challenges of Transnational Technology Governance.

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of developments in society, economy and culture that are related to the concept of “globalisation”. Thus, by clarifying the meaning of globalisation, the needs, opportunities and challenges for developing global strategies, procedures and institutions of TA will be set against a general background of global interconnectedness and change. Technology plays an irrevocable role in this. “The pace of globalisation and that of technological change have in fact been strictly interrelated and, from a long-term perspective, it appears less important to establish which one should be considered responsible for triggering the other rather than to establish that they mutually enforced each other.” (Archibugi & Iammarino, 2002) S&T are thus drivers as well as mediators and facilitators of globalisation. At the same time, they are a source of global problems and challenges as well as options to address these. In both respects, S&T are at the centre of global societal and political debates about the needs and opportunities for global governance and world politics. We will touch on the role of S&T when going through the history of globalisation and expanding on the main features and problems of our current global situation.

By a tour of the central issues touched upon in the discourse on globalisation, we hope to clarify the broad scope of questions and problems that challenge the necessary global attempts to govern the process of globalisation. Approaches to and concepts of science-based advice to policymaking such as TA are part and parcel of governance on the national level (Hennen & Ladikas, 2019; STOA, 2012; van Est, 2019). We argue that it is necessary for this policy intelligence practice to transfer its methods and institutional setting to a global level. This is a challenge in itself, and what kind of solutions will be found remains open. The main task is to support the reflexivity of global governance, its ability to learn and critically reflect on currently established routines, as well as to take into account uncertainties of knowledge, and ambiguities when taking action.

In the case of ambiguities, it is necessary to include a broad scope of differing and sometimes conflicting values in the process of identifying problems as well as viable and effective policies. The values to be taken into account imply a broad scope of accounts of what has and can be done, and a broad scope of visions of what the meaning and future of a “common good” at a global level might be. TA at a national level works in an inclusive mode, by trying to provide for participation of all relevant voices in deliberation on policymaking. To do this, TA needs to rely on and address itself to an attentive public and an active civil society as central parts of its “habitat” (Hennen & Nierling, 2015), which at best is in the making on a global level. Each contribution to this volume discusses different aspects of the challenge for S&T governance set by globalisation. This essay aims to make clear that the latest stage of what has been called “reflexive modernisation”, which we understand as globalisation, needs “reflexivity” in answers to its challenges.

The paper starts with a brief discussion of the long history of globalisation in order to clarify what is characteristic of our current stage of globality. It then outlines some central features of what globalisation currently comprises and sketches globalisation as reflexive modernisation. Next, we present the ambiguities—in terms of goods and bads—of globalisation and the associated challenges of a “cosmopolitan” perspective on governance. We do this through a discussion of three fields or dimensions of

globalisation. The final section discusses the relevance and implications of these trends for global governance and the role of scientific policy advice.

## 2 Globalisation—A Modern Phenomenon with a History

Globalisation encompasses a complex set of societal dimensions and thus is subject also to scholarly debates on its sources, drivers and features, as well as its meaning for and bearing on the future of culture and politics. Such controversies include debates on whether what we experience as globalisation is altogether new. Without being able to enter deep into this discussion, we briefly outline the history of globalisation since this will aid understanding of what it means to be “globalised” nowadays.

### *Pre-modern globalisation*

Some hold that globalisation can be dated to antique times since in these pre-modern periods we can also find many examples of cross-border exchange or mutual influence in cultural, economic and political terms. Pre-modern Egyptian, Persian, Indian, Mongolian, Chinese and Roman empires connected great and culturally diverse territories or regions under one power regime, implying intensified economic and cultural exchange (Abu-Lughod, 1989). The development and global expansion of world religions (Christianity, Buddhism, Confucianism, Islam) can be regarded as a unification of world views and moralities held in different regions of the world. Some authors regard certain common features—such as individual ethical self-reflection—as a possible fundament of cosmopolitanism and moral mutual understanding (see the debate about the “axial age”, for an overview Bellah & Joas, 2012). Many of the fundaments of Western modernity are based in cultural achievements from other parts of the world and have been adopted in Europe as an effect of pre-modern interchange: “Coins, paper money and complex bureaucracy were legacies from China. Monetary policy and commercial credit came from Chinese and Arab mini-globalizations. The Arabic numeral system allowed double-entry bookkeeping, essential in accounting, while maritime regulation came from the East. These developments are central to systems such as capitalism and bureaucracy that define modernity and modern globalization.” (Martell, 2017, 61) Thus, modern globalisation owes a lot to pre-modern cross-border and cross-cultural exchange, although it goes far beyond historic phases in terms of its scope and the intensity of interconnectedness.

### *Capitalist globalisation*

In addition, the modern state of globalisation is based in fundamentally new material and cultural fundaments of modern societies—such as rationalisation of world views and modes of social integration, democratic and authoritarian modes of government, individualism, as well as the market economy, industrialisation and capitalist modes of production. The global spread and relevance of these features are connected with the European-driven colonialist expansion of circles of political and economic activities beyond regional boundaries since the fifteenth century. It presents a history of

military violence and occupation, of political, economic, cultural and religious domination and of human exploitation, including slavery. This repressive and Eurocentric process led to the fostering of a modern view of humanity and a universalistic mode of morality. The ideas of universal human rights and individual freedom, as reflected in moral and philosophical thinking of the European enlightenment (*Rousseau, Kant, Locke*), are closely linked to perception and awareness of the multitude of cultures and ways of life that was made possible by the connection of remote areas of the globe driven by European political and economic interests and legitimised by ideologies of European supremacy (see, e.g. Powell, 2014).<sup>1</sup>

Following Wallerstein's (1980) account of the "world system", globalisation is an effect of capitalism, since striving for capital valorisation has an impetus in itself to expand the scope of markets and investment opportunities. Thus, today's global system largely dates back to the sixteenth century when European capitalist actors started to expand their reach to the Americas and Asia. These transatlantic and Pacific explorations were enabled by significant progress in navigation technologies. The next globalisation wave in the nineteenth century was also driven by economic motives and supported by new technological developments. The intensified inter-European and transcontinental interchanges in the area of "industrialisation" were driven by new mass production technologies. New transport technologies such as railways, steam ships and later aeroplanes also improved the means, reach and speed of interchange. This wave of globalisation, which was closely linked to the struggle between the colonial ambitions of Western countries, also introduced new conflicts in social relations and politics, as was reflected in the Communist Manifesto of Karl Marx and Friedrich Engels in 1848 (Marx & Engels 1998). Their analysis is not too far from descriptions of the dynamics of globalisation which we face nowadays (Katz, 2001). The Communist Manifesto describes the liberation of economic and cultural activities from local embedding and the resulting "interdependencies". Domination and exploitation came about at the same time with opening up from local or national "seclusion" and "self-sufficiency".

The second half of the nineteenth century was a period of unprecedented economic interchange and interdependence. The First World War destroyed the level of formation of a world economy, and it took until the 1970s to reach the same level (Strikwerda, 2016). With World War I, the area of economic interchange experienced a national backlash but nevertheless and ironically provided the start for a new "world system" (Wallerstein), but with the United States rather than Europe at the centre. It is possible to speak of globalisation since World War I in terms of geopolitical thinking and attempts to establish global institutions of governance. As *Eric Hobsbawm* put it, the world, the globe, instead of nation states and national economies is the "primary functional unit" to refer to economically and politically (Hobsbawm, 1998, 30).

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<sup>1</sup> A comparable "de-nationalisation" of world views had been observed in the late Roman empire, with the dominant philosophical-religious school of the Stoa establishing "humanity" (enclosing the whole "oikumene"—the then known inhabited world) as the reference for moral reflection.

With the end of the Soviet empire in 1991 and the end of the Cold War, the bipolarized geopolitical shape of the world dissolved and Western Liberalism with its democracy and market economy appeared to be the only alternative (which made some observers speak—prematurely—of the “end of history”, Fukuyama, 1992). The apparent “victory” of the Western system together with options provided by digital technologies gave rise to the notion of a globalised world in terms of socio-political order, as well as socio-cultural closing of ranks (“the global village”, McLuhan, 1962). At the same time, people became aware of global problems, such as global economic crisis and climate change. It was these developments that made the term “globalisation” a salient subject of political and scholarly debate in the 1980s and 1990s (Martell, 2017, Introduction).

Although colonialism no longer exists (in its historic manner of political expansion), and power relations have shifted significantly since the nineteenth century, economic interests and the capitalist economy still foster global interdependencies and establish new centres and peripheries in terms of economic power and benefits. Globalisation can be regarded as a project driven by economic motives and to a great part facilitated by technological progress.

This is not an exhaustive characterisation of today’s global state of affairs and of the variety of political, cultural and economic aspects that have been the subject of scholarly debate on the push of globalisation since the 1980s. Those discussions are busy reflecting on the new aspects and features that discern the recent wave of expanded global interchange and interdependence from historic phases of globalisation. Whilst we cannot go into the details of these controversial debates here, it is necessary to develop some systematic understanding of what “Globalisation” means or encompasses in order to better understand the need for and the options of global technology governance and the role of TA.

### **3 Modern Globalisation and Reflexive Modernisation**

What is “modern” about “modern globalisation”? In this section, we consider the question of what, behind all the different features related to globalisation, can be regarded as the core characteristics of our current state of global interconnectedness.

Current transnational interrelations show more expanded global outreach than historical modes of transnational interconnectedness. Changes in production and trade as well as politics or culture in one part of the world may have repercussions beyond local, national or regional spheres. This implies interdependency of national economies and politics, including in terms of the unintended side-effects of activities such as global environmental problems or global risks (see Sect. 4.3). What is also apparent is the speed and intensity of the exchange of knowledge and data. Global communication today means real-time communication, ranging from huge financial transactions to being connected live with all kinds of political or cultural events in all parts of the world, and the possibility of posting your own thoughts and beliefs about the latter to the “world” via social media. Ideas developed in one part of the globe can

easily travel to any other part. The distinction between local and domestic experiences and the global arena is losing relevance, and the impacts that the local might have on the distanced and vice versa are magnified, and its effects are accelerated.

Thus, the core of modern globalisation might be caught by the term “supra territorialism” (Scholte, 2005), which means that territory no longer makes a distinctive difference, and social activities are not defined or bound by territories, due to the shrinking of time and space based on technologies of exchange. Proximate local issues and problems are caused by distant decisions or developments, and call for a non-parochial perspective to address them. The relevance of local connections remains, but people’s working relations, their private social networks, their welfare and ultimately also their identities are no longer mostly defined by their local or national environments, structures and institutions, but are dependent on—and partly an effect of—global interconnectedness and interdependencies. This means that everyday life is increasingly determined by structures set up by transnational corporations and policies, and problems of global relevance (such as climate change), as well as by lifestyles whose element and forms are defined and shared globally.

Contemporary globalisation is thus accompanied by a *consciousness of globalisation* that manifests itself both in the global discourse as well as in everyday experiences, apprehension and expressions of globalisation in all layers of society. We are not only objectively globalised, but we are also becoming increasingly aware that local or national boundaries neither restrict our activities nor protect us to the extent they might have in former times. Because of the increasing interdependence and consciousness of the global whole (see, e.g. Robertson, 1992), globalisation has become a “new symbolic experience” (Martell, 2017, 53) embedded in our identities and the ways we understand the world and our future (for the good or the bad), and thus is referred to in almost every discourse on politics, culture and economy.

From a sociological perspective, all this is not in the first line based on some independent dynamics of trans-local interchange but are fundamentally features related to modernity. For *Anthony Giddens*, who provided one of the first influential sociological accounts of globalisation (Giddens, 1990), globalisation is a feature of the general process of modernisation (and vice versa), which is characterised by “dis-embedding” social relations, and reflexivity of social institutions. Social activities are increasingly dependent on remote activities, provisions and institutions—not as a result of globalisation as such—but as a result of different dimensions of the process of modernisation, i.e. rationalisation, scientification, devaluation of traditional knowledge, trans-local division of labour, capitalist market economies and monetarisation. Thus, the reorganisation of the social dimension of space and time which appear to be an effect or the essence of globalisation is basically a feature of modernity. When regarding socialisation (the forces of integrating and constituting societies) at its core as a problem of organisation of time and space, it is apparent that “... in the modern era, the level of time space distanciation is much higher than in any previous period, and the relations between local and distant social forms and events become correspondingly ‘stretched’.” (Giddens, 1990: 64). What the previous section described as a feature of globalisation—the “dis-embedding” of the local and

its dependency on widely dispersed structures in time- and space—is for Giddens an aspect of “reflexive modernisation”.

Contemporary globalisation is the latest consequence of this process. It is characterised by “intensification of worldwide social relations which link distant localities in such a way that local happenings are shaped by events occurring many miles away and vice versa” (Giddens, 1990, 64). This implies economic dependencies, but might simultaneously bring about contradictory cultural shifts. Giddens believes that a global “stretch” of social relations might loosen the mental bounds to socio-cultural and political dimensions of the nation state and at the same time “be causally involved with the intensifying of more localised national sentiments” (ibid., 65). Modernity is not only a structural process but also affects individual and social identities which become “a reflexive project” (ibid., 124) in the sense that they are no longer pre-stabilised by local traditions and commitments, but have to be constructed individually, and become a subject of “life politics” (Giddens, 1991). This might lead to cosmopolitan attitudes as well as to a reaffirmation and demarcation of group identities, the conflictive effects of which we nowadays see in fundamentalism, nationalism and identity politics.

Giddens discerns four dimensions of globalisation: the nation state system, the world capitalist economy, the world military order and international division of labour (Giddens, 1990, 70f.). The division of labour dimension refers to industrialisation—transformation of nature, development of a created environment (ibid.: 59)—and includes a focus on production technologies and the environmentally negative consequences. In this volume and in TA, we are concerned with S&T in general and its socio-cultural meanings. Cultural globalisation is driven by communication technologies (from letterpress to modern communication technologies), which, according to Giddens, are the driving forces behind central features of modernity such as social expansion, loss of traditions and local perspectives, rationalisation and reflexivity.

At this point, we arrive at what the terms “reflexive” or “second” modernity, as applied by Giddens, Ulrich Beck and others (see Beck et al., 1994) actually mean: the confrontation of (first) modernity with its “non-intended” consequences and side-effects, as well as the process of applying reflexivity and critical scrutiny—the heritage of enlightenment—to the fundamentals of modernity itself. This includes the promise of scientific rationalisation (and its material outcome: modern technology) as a guarantee for increasing social wealth and security. The success of modernisation in bringing about relative wealth for a greater part of society and increasing the reach and effectiveness of human intervention in nature unavoidably brings negative side-effects and systematically comes with risks and new uncertainties which lead to new conflicts and legitimisation problems for governments and experts. Modern forms of technology governance and problem-oriented research like TA can be regarded as an answer to these problems. The idea, mission and practice of TA can be understood as emanating from reflexive modernisation (Delvenne et al., 2011; Hennen, 1999, Grunwald, t.b.p). Although it is quite obvious that globalisation, with its achievements and problems, is part of or an enactment and consequence of modernity, it must be seen also as underlying the problems of “reflexive modernisation”, which

explains much of its ambivalent character. We will touch on examples of these issues in the next section.

## 4 Three Dimensions of Modern Globalisation: Culture, Economy and Risks

The debate on globalisation is not just a debate about its sources or about the level of interconnectedness and interdependency; it is essentially a debate about what globalisation has brought about or will bring about in the future. A positive normative connotation of globalisation as a vision of cosmopolitanism, global exchange across world views, global joint problem-solving and global democracy might be widespread, but this vision is not uncontested, and those in favour of it are also aware of the problems that globalisation brings and the challenges ahead in this cosmopolitan vision of globalisation. The debate on globalisation is not only concerned with and driven by the question of how globalisation proceeds, but always also evolves around the question of whether it is for good or for bad.

### 4.1 *Cultural Globalisation*

As well as capturing the often contradictory and diverse developments that can be regarded as features or effects of globalisation, one of the central problems is the question of “global culture”.<sup>2</sup> Are we on the way to cultural homogeneity, to a global culture, i.e. a worldwide alignment of ways of life, world views and normative orientations? Opinions are strongly divided and range from bold statements on the increasing homogeneity of culture across the globe to a diversification or even a “clash of cultures” (Huntington, 1996). In the latter notion, globalisation is regarded as the cause of conflicts and terrorist activities of cultural fundamentalism. This clash can also be observed from a different angle when national governments perceive criticism based on Western notions of human rights and democracy as illegitimate interventions in their internal affairs and cultural traditions. It is not our intention here to give a consistent analysis of the debate on global culture; the point we want to make is that technology matters.

Since the 1960s, electronic mass media (namely TV) and the economic Western hegemony in the production of media content have enabled the diffusion of (mainly) the American way of life and norms and values around the globe, by means of movies, TV soaps and advertisements, but also political news broadcasts. This has led to the notion of the homogenisation of cultures: globally, people are watching the same TV shows and formats, play the same video games and consume the same products. This

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<sup>2</sup> The following paragraphs owe much to Martell (2017) where a more detailed analysis of the complexity of cultural globalisation is available.



has often included the notion that Western culture is about to erode local or regional cultures and that authentic cultural identities are substituted by an “impoverished” global consumption culture. So cultural imperialism and commercialisation are often seen as the drivers of homogeneity (see, e.g. Bourdieu, 2003).

However, salient phenomena referred to as “glocalisation” can also be observed. There are means to adopt formats as well as content to local or regional traditions, needs and values. And some of the changes in global culture obviously travel the other way—i.e. cultural production of Asia and Africa (lifestyle, music, movies, as well as world views, philosophies, religion) are adopted in Western countries. These phenomena lead to the notion of a “hybridisation” (e.g. Nederveen Pieterse, 2004) of global culture. Due to the intensified and extended exchanges made possible via new media as well as by international tourism and massive migration, we arrive at a global culture which is a mix of inputs from all parts of the world. “Global cities” such as London, New York or Hong Kong are regarded as knots of globalisation, where cultures are mixed and identities are manifold (Sassen, 2001). The same process may, however, also imply a loss of ability for local communities to keep their identities or produce meaning for their members whose identity is shaped more by foreign influences than by local experiences (Bauman, 1998; Beck, 2017). The Internet allows for a diversification of the cultural content produced and dispersed. Thus, there is an abundant space to express cultural identities and political views which are opposite to dominant political cultures and interests. The migration from Asia and Africa to Western countries (often from formerly colonised territories) leads to introducing new cultural elements into Western nations that may be either acknowledged as “multi-culturalism” or opposed by xenophobic right-wing populist groups. So, it is not clear whether hybridisation of culture is leading to an increasingly shared global culture or to a (peaceful or conflictive) coexistence of hybrid cultures and ways of life.

As discussed above, communication technologies, migration and global travel currently create global interconnectedness on the symbolic level. Economic calculus and commercialisation are important drivers which shape the content and values that make up the cultural exchange. At the same time however, this interconnectedness allows for a diversity of cultural expressions to come into dialogue with one other in a way not previously possible. This involves options for creativity and enrichment of cultural experience and also presents a source of conflict about identities. The central question is to what extent our economic interdependence, as well as the ways in which we are affected by global problems, is accompanied by developing a cosmopolitan perspective, or at least a widespread feeling of global citizenship. And further, to what extent can global digital exchange contribute to a sense of global citizenship, or in contrast lead to strengthening group identities that experience themselves as exclusive and superior to others? The political implications of cultural globalisation are pivotal to this.

## 4.2 *Economic Globalisation*

History shows that specialisation and rationalisation of production, including national and later international division of labour and the search for new markets and profitable trade relations, have been central driving forces for global interchange. This process has always been facilitated by technical and social innovations opening up new options and allowing the expansion of the exchange of goods and of resources all over the globe. In the 1990s, this culminated in technical options for real-time exchange and dislocation of finance. Technical innovations, like the Internet, have facilitated salient features of globalisation such as migration (of labour and tourism), the availability of information and news from all parts of the globe to everybody, globally integrated production chains, and global markets, as well as the socio-cultural modes of globalisation. According to McKinsey (2019, 72), cross-border data flows have grown 148 times larger from 2005 to 2017 (measured by used cross-border bandwidth: from 5 terabits in 2005 to 704 terabits in 2017). Innovation is the driver of the global integration of production and trade, in terms of facilitating global transactions. Innovation also fuels the production and exchange of commodities. At the same time, economic rationalities and increasing international competition are driving the innovation system through internationalisation of technology development and knowledge exchange. The big players of the digital economy are multinational tech companies using integrated production and supply chains all over the world.

Since the 1980s, the global exchange of goods and services has been growing significantly, and the production chains have become more and more complex. In 2019, the global trade value of goods exported throughout the world amounted to approximately 19 trillion U.S. dollars at current prices, compared to around 6.45 trillion U.S. dollars in 2000 ([www.statista.com](http://www.statista.com), 26-07-21). Foreign direct investments have been growing massively from 1990 (239.4 billion \$) to 2007 (3.134 trillion \$) ([data.worldbank.org/27.07.21](http://data.worldbank.org/27.07.21)). The financial crisis of 2007 brought about a slowdown of economic globalisation. Foreign direct investments went down to 1.744 trillion \$ in 2019. But still, world trade has been growing significantly, although not faster than industrial production (Felbermayer & Görg, 2020, 264). Most significant for globalisation is the relevance of knowledge-intensive goods and services. Although globalisation is often identified with the global exchange of labour-intensive goods, with China as the current largest producer, value chains in this sector represent only 3% of global gross output and employ only 3% of the global workforce. Value chains of knowledge-intensive goods production (automobile, computers, machinery) account for 13% of gross output and even 35% of trade (McKinsey, 2019, 2).

The interconnectedness of the world economy brings about not only an increase in international trade and production, but also new insecurities and vulnerabilities. As shown by the financial crisis of 2007/2008, the international mobility of finance—driven by the real-time exchange of money and investments made possible by the Internet—induces repercussions on the world economy from local or regional events

(like the breakdown of the American real estate market). The central question that sparks fierce political and scientific debate is: who benefits from economic globalisation? This question is closely related to the effects of neoliberal politics as well as to changes in international power relations.

The push of the globalisation of economic exchange in the decades after World War II (which took over from the phase of European colonialism in the nineteenth century) was clearly dominated by the US and its Western partners, who in the 1980s shifted to neoliberal politics demanding the abandonment of market regulations and protectionist barriers (see, e.g. Crouch, 2018). The effects of this policy pushed advanced economies significantly, but also led to pressure on the Western welfare system, inducing new inequalities within Western economies. This pressure increased with the entry of China into the global market, which together with the countries of the former Soviet Union had formerly been excluded from globalisation. Low-wage production was shifted to China and other Asian countries, and Western economies had to foster economic activities in high-wage production and service activities, with problems for the low-wages sector of their home labour markets. This was connected with an increasing tendency of parts of the population to apprehend “globalisation” as a menace to their economic situation. This has contributed to strong nationalist and (in connection with global migration of workforces and refugees) xenophobic tendencies, indicating a countertendency towards cultural globalisation (see above).

With regard to international relations, Asian countries whose economies had been pushed by global economic exchange—especially China—could increase their international weight drastically, thus ending the phase of Western (US) domination. For people in emerging economies, the globalisation push of the 1990s has come with stronger participation in world trade and a higher level of welfare for a growing sector of the population, especially in China. Since 1990, a billion people outside the advanced economies have emerged from poverty, which for critics of current international politics like Crouch (2018) is a reason to dismiss any attempt to return to national protectionist policies. Compared to 1995, in 2017 developing countries’ (excluding China) share in the world market as regions receiving goods and services increased from 20 to 29%, with China’s share increasing from 3 to 12%. In terms of production, the share of non-Western countries in the global economy has also been increased (although mostly for developing countries in low-wage value chains). China’s share in global output grew from 6% in 2000 to 33% in 2017 (McKinsey, 2019, 64). In China today, only 1.9% of the population live in poverty. However, as in other new economies, economic development is unequally distributed within the country: the inequality of the distribution of wealth in China nowadays is (according to the Gini coefficient) greater than in the US (Crouch, 2018 24).

The pressure of neoliberal politics—executed for a long period by the International Monetary Fund (IMF) and World Bank—on developing countries to open their markets for international trade often worked out negatively for emerging economies because they could not compete with stronger economies. Thus, while South-East Asia was able to benefit from globalisation, most African countries could not. And moreover, less advanced economies are more vulnerable than advanced economies to critical developments of the world economy. For example, the reduction of foreign

direct investments (see above) during the recent COVID-19 pandemic years hits transition economies much harder than advanced ones (UNCTAD, 2021). The opportunities for emerging economies to actively participate in global markets (not only as a provider of raw materials or as an extended cheap work bench for advanced economies) strongly depend on access to technologies. To achieve this, support is required in assessing options to adopt new technologies in an environmentally and socially sound way to limit negative repercussions for societies—meaning that concepts like Technology Assessment would have a role to play (Ely et al., 2014).

Despite the positive effects of globalisation for many people in emerging and transition economies, it is still the case that the countries which benefit most from globalisation are the advanced OECD economies (paradoxically often those with the biggest problems with national-populist reactions among their populations). The UN World Social Report “Inequality in a changing world” (2020) states (taken from the report’s summary):

- Although the income inequality between countries did improve during the last 25 years (mainly due to strong growth in China and other emerging economies), the gap between countries is still considerable. Average income of people in North America is 16 times higher than of people in Sub-Saharan Africa.
- Income inequality between countries has improved but inequality within countries has grown. Today, 71% of the world’s population live in countries where inequality has grown.
- Income and wealth are increasingly concentrated at the top. In 2018, the 26 richest people held as much wealth as half of the population (the 3.8 billion poorest people), down from 43 people the year before.
- Although gender inequalities have been shrinking for some woman in certain occupations, at the same time women and girls put in 12.5 billion hours of unpaid care work each day, a contribution to the world economy 3 times the size of the global tech industry.
- If climate change continues to be unaddressed, it will increase inequality within and between countries.
- With a global trend towards urbanisation, cities will find “high levels of wealth and modern infrastructure coexist with pockets of severe deprivation often side by side”.

### **4.3 Globalisation of Risks**

The relation between science, technology and society and the question of bringing the ever-accelerating pace of technology development and use into relation with the needs and values held by different groups in society has been at the centre of political and scientific discourse for many decades. The debate about how to come to terms with often negative effects of technology on society and the environment can be said to have changed the political landscape in terms of issues that are high on political agendas, and in terms of relevant political actors and parties, at least in

Western societies. TA is a product of this development. What is absolutely necessary in order to provide a full picture of globalisation, and has a special bearing for TA and technology governance, is the fact that the science and society discourse and its main reference, i.e. the problem of managing ethical ambiguities and social and environmental risks, has become a global discourse due to the global character of the problems to be dealt with, and the global strategies required to deal with these problems.

Global warming and the fiercely discussed need for global strategies to reduce the CO<sub>2</sub> footprint of our economies is only the most salient example of how we are not only globalised in economic or cultural terms. We are also a global community both producing and affected by risks. The risks that we necessarily take while we are shaping our futures through our growing capacities for action and intervening in the world are of global character, as is the uncertainty of the knowledge that we necessarily produce and have to deal with when trying to manage these risks and decide on safe enough, ethically viable options to pursue, on the individual as well as the societal level. Globalisation in this respect also proves to be the most advanced state of “reflexive modernisation”, of the process of undermining the hopes and rationales of modernity, and its belief in the unambiguous benefits of technical progress as well as the application of its heredity of rational criticism and scrutiny to the achievements of modernity itself (Science, Technology, Rationalisation of all kinds of human activities).

What have been discussed as features of the “risk society” on a national level since the 1990s (Beck, 1986/1992) have now become issues of the “world risk society”. In the 1980s, the depletion of the ozone layer of the atmosphere caused by the worldwide use of chlorofluorocarbons was one of the first phenomena to be perceived as an effect of global production of environmental risks. The finite nature and instability of fossil fuel supply had become obvious in the 1970s, making it clear that global natural resources are limited. Nowadays, the planetary boundaries of various fundamental resources, such as arable farm land or freshwater, are acknowledged (see, e.g. Rockström et al., 2009). Air and environmental pollution could never be regarded as phenomena that end at national borders, and the pollution of the world oceans with plastics, the remainders of the essential material of modern lifestyles as well as the global reduction of biodiversity make this all too obvious.

Conflicts about the distribution of the benefits and risks of innovations (whether in terms of environmental risks or the effects of new production technologies on economies and labour markets) are now global conflicts. The question of “who will be the losers, who are the winners of modernisation?”, the questions of access to resources, knowledge and markets all need to be addressed on a global scale. There is also the question of who should contribute, to what extent and how, to developing the necessary strategies of reduction of resource consumption and outputs. The prime example is the much-needed reduction of CO<sub>2</sub> emissions by changes to sustainable production and lifestyles, where it is important to note that the carbon emissions of the richest 1% are more than double the emissions of the poorest half of humanity (see, e.g. Oxfam, 2020).

As regards to ethics, it appears to be difficult to align the challenges of innovation such as human in vitro fertilisation (IVF) and the promises of embryo research or of genome manipulation with relevant values and religious beliefs at the level of national policymaking. Reaching a consensus on ethical barriers and effective legal regulations in biotechnology, synthetic biology or nanotechnology is a global challenge for which mutual respect and productive exchange of cultures are needed (Ladikas et al., 2015). Not least, the push of global real-time exchange of data and the related risks for privacy, and of abuse of the Internet for manipulating political debates are issues induced by the global character of digital networks that demand global political reactions. The social networks are as global as the sources of manipulation and misuse that are driven by digital warfare and criminal activities. The list of global risks seems endless and includes challenges attached to global migration, cultural globalisation and global terrorism.

Thus, we are a global community with respect to the central challenges we face in our everyday lives and in politics. *Beck* (2017) argued convincingly that we are facing a “metamorphosis of the world” that asks for a new global perspective, including social scientific analysis, since the societal structures, interdependencies and problems as well as political options that we have to take into account in our private and political lives can no longer be restricted to the perspective of the nation state. Central concepts of societal change, societal revolution and transformation that are tied to the concept of the nation state are no longer valid or useful and have to make room for what *Beck* calls “methodological cosmopolitanism”, that is, the systematic account of the cosmopolitan character of modern society and its problems.

The driver of this “cosmopolitan” metamorphosis is the world risk society and its “comprehensive, and profound failure” indicated by global environmental problems, world poverty, global inequality, global economic crisis and the related global conflicts (Beck, 2017, 32). But the other side of this, *Beck* holds, is the fact that a new cosmopolitan consciousness is growing alongside the problems. The global complaints and allegations regarding these problems are indications that also subjectively we are cosmopolitans—we are aware of the global character of our situation and we know that we can only deal with them by taking up a cosmopolitan perspective. Also, our risk perception and the normative horizons we apply in our search for solutions are becoming (or must become) “cosmopolitan”.

## 5 The Need for Reflexive Global Governance

Now that we have become a global “community of fate” (Beck, 2017), it still needs to be proven whether we are able to form a global community of action, a political community. And this, first of all, is a question of global awareness of the global character of the challenges ahead and the willingness to take joint action on a global scale. Is there a potential for (democratic) world politics based on a common civic culture allowing for open global exchange about joint problems and their possible solutions?

With regard to policymaking in the field of environmental risks, technological innovations and their ethical and socio-economic implications, the question is whether it is possible on a global level to implement adequate structures and processes of deliberation and decision-making. This would require institutions and procedures that allow for “reflexivity”. “Reflexivity” means to reflect on the uncertainties we face and critically assess the knowledge at hand, including different cultural views as well as the variety of needs and capacities that are given by differing environmental conditions (such as climate or access to water). Reflexivity includes taking into account the existing inequalities and asymmetries of the global economy.

*Sheila Jasanoff (2007)* speaks of “global civic epistemologies” that comprise the ways, procedures, institutions and rules of societies to achieve consensus about what we can hold to be certain or legitimate as arguments, what uncertainties we actually are faced with and what are realistic options for problem-solving. This involves formal as well as informal structures of exchange and deliberation. It involves institutions of representative democracy that are informed by the best science as well as by their citizens. It asks for an open public sphere, a space accessible to everybody for the exchange of information and arguments. It needs an active civil society providing for a system of articulating needs and problems and monitoring the performance of political decision-making with regard to these. It depends on a variety of sources of knowledge production that can serve as independent and trustworthy references for societal reflection and discourse. It also would include all kinds of informal political communications such as fora and meetings, as well as online and offline deliberations. All of these would be needed on a global level. Some exist already or are emerging alongside growing awareness of global risks, such as global fora of problem definitions and mutual understanding as well as more manifest negotiations about mutual commitments or agreements that come close to globally binding legal regulations. The shape and functionality of a global system of civic epistemologies are however a desideratum which has to face many challenges.

With a view to global discourses as well as social movements regarding central aspects of the world risk society (climate change, environmental pollution and sustainable use of global resources, equal access to technologies and knowledge, economic inequalities and unequal development, migration and refugees), there is reason for some humble optimism. There are indications that a cosmopolitan consciousness and a feeling of global citizenship is evolving and is able to put pressure on institutions of governance at the national as well as the global level. The growing involvement of civil society organisations in the activities of international organisations and global phenomena of public awareness—such as Fridays for Future, a youth-led and -organised global climate strike movement—indicates that a central feature of democratic problem-solving can function on a global level. This is the observation and criticism of politics by attentive publics, and the awareness and responsiveness of decision-makers to such global publics and their manifestations in their home countries. Thus, there are some indications that Beck was right when stating that “... global risks bring about globalised public spheres – these again make global risks visible and equip them with political relevance” (Beck, 2017, 168, see also the chapter on the global public sphere, this volume).



At the same time, we have seen in the section about cultural globalisation that “globalisation of minds” is an ambivalent and conflicting process. People have the means to communicate in real time across the globe and are aware of the situation and mind-sets of other regions of the world like never before. But we should not overlook that the great bulk of communication around the globe is of commercial character, and the commercialisation of culture globally appears to function as a vehicle to spread Western lifestyles and consumerism (see, e.g. Bourdieu, 2003). The means of global communication can be misused for disinformation and also bring about counter-reactions of fostering nationalism and populist movements that regard globalisation as a menace to cultural identities. Due to disparities and asymmetries in the world economy, there are also asymmetries in the opportunity to articulate one’s views. In addition, hegemonic cultural structures benefit disproportionately from means and technologies of cultural globalisation. This clearly affects the normative foundations of options for global governance of S&T. Even ideas as universalistic as global human rights can serve as vehicles for Western hegemony when connected with neoliberal concepts of economy. They can be used to hide or justify the continuing existence of discrepancies in access to markets, and thus to welfare and participation in the benefits of globalisation. How do Western accounts of individual rights relate to other more collectivist or economic ideas of rights, such as the right to food and water? Thus, despite strong indications of an emerging “cosmopolitan” perspective on the goods and bads of globalisation, there is a huge task ahead to provide for spaces and opportunities where cultures can meet and discuss differences in what they regard to be the problems of our time and world. These need to be meeting spaces where people can reflect on the values they want to apply to evaluate the societal meaning of innovations and the acceptability of risks, and on how widely accepted values such as equality, justice, welfare, the common good and individual liberty and dignity actually can be meaningfully applied to concrete problems.

Besides deliberative spaces, global civic epistemologies also need functioning global structures of governance and decision-making. Globalisation has brought about a decline of the governance powers of the nation state. And so far this is counterbalanced only by weak structures of transnational governance. The increased integration of the global economy has strengthened the ability of globally operating transnational companies to direct investments to economies with conditions that fit their purposes best in terms of the price of labour and resources, as well as low levels of social-welfare restrictions and regulations. As a consequence, the abilities of nation states to preserve the social contract based on welfare policies have become restricted. For many, this represents one reason for the growth of populist movements and policies over the last two decades. According to some, the increasing powers of non-state actors in setting the rules of international economic exchange—which is also manifest in the often neoliberal policies of international organisations such as the World Trade Organisation (WTO) or World Bank—indicate the beginning of an area of “post-democracy” (Crouch, 2004). In addition, global risks delegitimise the national state: the foremost function of the national state is to provide protection for its population. Yet a national state’s capacities to do this are massively restricted by global risks whose sources and effects it cannot control. National law is only valid



for the national population, but blind with regard to the effects, and those affected, beyond its national boundaries (Beck, 2017, 132 ff.). The late British historian *Eric Hobsbawm* in his account of globalisation concluded that we are facing the global problems of the twenty-first century with a set of political mechanisms that are not fit to help. Neither the counting of votes nor the measurements of consumer preferences in a global market would help to solve the problems of a globalised world (Hobsbawm, 2009, 114 f.). Indeed, the international and transnational institutions of global governance that have been built up since the Second World War—most salient are the different programmes of the UN—lack democratic legitimation by not being directly accountable to a global citizenry. With the exception of the European Union, citizenship and related political rights are restricted to national boundaries. This democratic deficit combines with the difficulties in coming to international agreements on critical matters that go beyond a minimum consensus, and the restricted powers of transnational governance institutions to enforce the international observance of any agreements reached.

At the same time, there are strong indications of transnational awareness of the need for “cosmopolitan” policymaking in the light of global challenges and problems. This is indicated by the growing number and importance of international agreements on environmental, security and health issues supported by international organisations such as the WHO, OECD, WTO and not the least by the UN. Since the Earth Summit in 1992, the UN has made sustainable development a main issue in its activities and has set up a global exchange on how to translate defined sustainable development goals into international programmes of knowledge sharing, technology transfer and national programmes of economic development and innovation (see chapter on global governance, this volume). Other activities are related to health issues, to questions of security of digital innovations or to ethical evaluation and regulation of the use of biotechnology and human genome research. Most outstanding when thinking of reflexive modes of governance is the Intergovernmental Panel on Climate Change (IPCC), through which the UN has established a body of science and policy advice whose reports are acknowledged as an independent and reliable source of information all over the globe. Many of these achievements in establishing processes and institutions of global governance are dealt with in more detail in chapters in this volume.

The legitimation of transnational institutions of policymaking and transnational agreements is a critical issue. Citizens have influence on politics in the framework of the nation state but not at the level of the United Nations or other transnational institutes. For the moment, it appears to be utopian to think of a global democracy in terms of global elections and government. The authority of international governance structures (institutions and agreements) is critical. Global governance structures cannot rely on unquestioning recognition of rules and regulations by those who are expected to comply. Its authority is not based on cultural traditions and cannot rely on coercive means. The authority of global governance structures has thus been coined to be “reflexive authority” (Zürn, 2016). The recognition of authority is not a given but is a reflexive act, constantly open to critical assessment in the light of the legitimacy of the procedures applied, the “epistemic authority” of knowledge references (such

as, e.g. the IPCC), as well as the congruence between decisions taken and normative expectations.

There might currently be little prospect for more global democratic decision-making structures or institutions beyond the existing often not very powerful and conflictual ones. It is therefore more necessary to support the “reflexive authority” of existing structures. This can be done by providing for transparency and responsiveness in international decision-making and establishing strong connections with civil society. Both might best be achieved by—involving civil society organisations in global governance, as is already the case to some degree. But there is also a role for intermediate “reflexive” organisations and initiatives of policy advice in the field of science and technology. Such institutions—as among others the overview on TA activities given in this volume shows—exist around the globe and nationally are often already closely involved as an independent actor in policymaking.

The legitimacy of global politics can be supported with regard to the two central dimension of its legitimacy. First, the quality of decisions taken, which is the appropriateness and effectiveness of its output, and by this its acceptability by the addressees (output legitimacy). And second, the quality and representativeness of the data, arguments and articulated needs and demands that inform its decisions (input legitimacy). Both dimensions are supported at the national level by a broad scope of independent “knowledge brokers” (Pielke, 2007). Institutions like the IPCC do a similar job on the global level. To join forces between organisations involved in TA and policy advice for technology governance from all parts of the world would open up additional means in the field of S&T policy. The central task would be to provide problem-related normative knowledge, as well as factual knowledge based on TA studies from national TA institutions, and organise co-operative work to develop synthesis based on such studies. The central means would be to organise input from the global public and civil societies around the globe for international negotiations.

Governance is a term for a co-operative rather than a top-down mode of reaching policies and decisions in an increasingly complex policymaking environment. This complexity is even higher at the global level. Global governance is about more than just the relationship between states. It is about ways to involve a broad spectrum of actors in governance issues in order to achieve a best and best-accepted solution for problems by making use of the different sources of knowledge and the full spectrum of the potential for action. Global governance of S&T with all its implications for environment, health, the economy and social justice is, as has been stated by an expert commission of the EU, “... faced with the challenge of rapidly-advancing possibilities realized through research. Across borders the social contexts within which new knowledge is generated, distributed and regulated will vary hugely. Science nevertheless remains a non-state and transnational social institution, so that its governance is necessarily global, both internally and externally” (EU, 2016).

It is a complex task to make use of the many sources of knowledge that are provided by the social institutions of science around the globe to come to a critical assessment of both the state of research as well as of arguments in societal discourse. But this is needed in order to come to legitimate decisions on a global scale with regard to complex problems emerging from scientific and technological modernity, as there is

“... no sensorium for global risks, no direct perception and experience, no evidence achievable based on common sense alone” (Beck, 2017, 133). It is mainly through scientific evidence that global risks are testified and can be experienced. The issues of justice and equal access to the economic opportunities of globalisation as well as the challenges of aligning different cultural perspectives to problems and solutions need support from reliable knowledge arrived at in scientifically supported modes of global deliberation. This scientific mediation makes “reflexivity” and reflexive concepts like TA salient. The high level of reflexivity involved in this endeavour is exactly the level needed to face the risks and opportunities of globalisation. Reflexive modernisation, of which globalisation is maybe the most complex feature, needs reflexive global governance of S&T, where knowledge-based structures and institutions have a role to play as intermediates between science, society and policymaking.

- The sources and effects of globalisation are often of local character. Identification of problems and providing appropriate solutions is in need of “connecting the dots” through global networks of independent problem-oriented research and advice.
- A reliable knowledge base is needed as input to the search for common policy on a global level which affords reflexive and open exchange on the broad scope of effects of S&T on society in different national environments, on the different problems and perspectives in different parts of the globe as well as on different values and conflictive demands and expectations.
- Reliable input has to be elaborated to ongoing global discussions as well as policies (UN) on ways to achieve a sustainable, i.e. environmentally sound and socially equal and inclusive development of societies and economies.
- “Science in Society” as a concept and reality has to be spelled out on a global level. The existing systems and institutions of global governance lack democratic legitimisation and input from a wide range of relevant actors. TA can serve as a facilitator for inclusive formats in the mainstream zone of decision-making.

It is obvious that with these challenges ahead, TA has to think about its own role and mission. Reflexivity in this respect also applies to TA itself. Just as globalisation in the sense of cosmopolitan interchange cannot be about modelling the world according to Western standards and formats, “Global TA” cannot be about just exporting Western thinking about the central problems of the science and society complex to the rest of the world. As a means of global reflexive technology governance, TA may have to reinvent itself in the confrontation with problems, expectations and needs as defined by many and various cultures or communities. Problems of access to technologies, adopting these to local needs, and normative standards as well as economic and political power relations implied in the adaptation of new technologies then might be as much in the focus of standard TA studies as the assessment of risks and hazards, and the discussion of generalised ethical standards.

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