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A socio-technical transitions perspective for assessing future sustainability following the COVID-19 pandemic

Peter Wells, Wessam Abouarghoub, Stephen Pettit and Anthony Beresford

Cardiff Business School, Cardiff University, Cardiff, UK

ABSTRACT

This policy brief argues that the COVID-19 pandemic exposes the fractures in the contemporary global socio-technical order and offers the prospects of several different alternative futures. The policy brief explores the pandemic through the lens of the multi-level perspective on socio-technical transitions. The pandemic is framed as a meta-transition event at the landscape level of unprecedented scale, pace, and pervasiveness such that it permeates all socio-technical regimes simultaneously. The prospects for the future are then defined on a matrix that compares the strength of civil society and that of economic structures. The result is four distinct scenarios that are linked to contemporary discourses on socio-economic futures: business as usual; managed transition; chaotic transition; and managed degrowth. The scenarios are presented as a starting point for policy discussion and the engagement of societal actors to define social and economic possibilities for the future, and the implications that the different futures would have for ecological burdens. It is concluded that the COVID 19 pandemic can act as a catalytic event in which the legitimacy and efficacy of existing economic and political structures will be challenged and reshaped, and hence is an opportunity to redefine the ecological burdens our activities create.

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Introduction

Economic and social systems have been severely disrupted by the COVID-19 pandemic. Airlines have either closed completely or severely reduced operations, with warnings of corporate failure and requests for government financial assistance. The automotive industry has seen markets and production plummet. Shops, restaurants and bars have closed. Sporting venues and events have been postponed or canceled. Universities and schools have raced to adopt online learning, while wondering what the next academic year holds. The Organization for Petroleum Exporting Countries (OPEC) and its allies have promised a 10% reduction in crude oil production to bolster prices that were falling below US\$25 per barrel. Public transport has been shunned as passengers seek spatial separation from each other.

After many years of austerity following the 2008–2009 financial crisis, in the face of the current disaster governments have suddenly been able to afford economic rescue packages that just a few weeks earlier would have been an anathema. In parallel, the pandemic has exposed the fragility of many national health systems, the lack of security in the “gig economy,” and the reliance on just-in-time

minimum inventory global value chains. In the case of the Midwestern region of the United States, for example, Aaronson, Burkhardt, and Faberman (2020) estimate between nine million and 26 million potential job losses, equal to between 14 and 18% unemployment.

Prior to COVID-19, there was already an emergent discourse that the globalization of neo-liberal economics was faltering amid multiple strains to social, environmental, and economic systems (Spinney 2018; Flew 2018; Borriello and Brack 2019). Indicators of this looming failure include a slow-down in global growth in gross domestic product (GDP) and ballooning levels of personal, corporate, and government debt. Strong nationalist, protectionist sentiments had emerged in the United States, the European Union and elsewhere, creating a tension or underlying conflict between globalization and nationalism and causing some to question the corporate logic of global strategy (Anwar 2020; Cuervo-Cazurra, Doz, and Gaur 2020; Witt 2019). Thus, COVID-19 may have acted to accelerate and focus some of these emergent strains.

The COVID-19 pandemic has already sparked lively debate via multiple media on the role of the state in contemporary societies (Mair 2020), albeit

mostly in economic terms. Engagement with users, policy makers, and other social actors can, however, be enhanced by the a priori development of scenarios as a mechanism to engage in the governance of transitions (Schippl 2016), and to encourage a focus on wider sustainability issues. Hence the scenarios proposed in this policy brief are intended for such a role. Scenarios are useful cameo devices to instigate discourse around possible futures. Scenarios are usually employed to garner a multiplicity of perspectives from different stakeholders on possible futures that may be more, or less, ideal. In this policy brief the use of scenarios is different. The scenarios are offered as alternative visions of the future in order to stimulate and guide inputs from stakeholders. They allow stakeholders to be more reflexive, to contemplate their current understanding of the situation and to engage in a scientifically informed consideration of the future from this point.

The contribution takes the following form. First, the basis of alternative transitions is outlined, drawing on the “whole system” perspective of transitions theory. Thereafter, the four potential scenario thumbnails are described, and then related against the multi-level perspective (MLP) concepts of landscape, regime, and niche (Geels 2002; Geels, McMeekin, and Pfluger 2020). Finally, the discussion section considers the implications of the contemporary situation for the prospects of the scenarios coming to pass.

Alternative meta-transitions

Transitions theory has usually been used to analyze specific components of contemporary socio-economic systems such as energy, mobility, or food. However, the COVID-19 pandemic has had a powerful impact at a higher level of aggregation. While specific systems and places are not all affected equally, the coronavirus outbreak has been notable for being global, rapid, and exceptionally pervasive in the way it has disrupted existing practices. The crisis is, therefore, in the language of the multi-level perspective, a meta-transition event at the landscape level that permeates into multiple regimes simultaneously. Transitions theory considers and integrates multiple system elements into an analysis, including technology and innovation, markets, business, government, behaviors and norms, regulatory and governance frameworks, and change pathways. Figure 1 distills these insights. The scenarios are expanded upon in the next section.

In Figure 1, the complexity of the situation at global and national levels is much reduced, and it is likely that specific empirical inquiry is needed to

Business, markets, finance and economy	Strong	Business as Usual	Managed Transition
	Weak	Chaotic Transition	Managed Degrowth
		Weak	Strong
		State, governance and regulation	

Figure 1. Framing alternative post-COVID 19 futures.

investigate the regime and country-level implications of the post-COVID-19 period. However, the prevailing conditions for systemic change are defined in terms of two main characteristics: civil society (the state, governance, and regulation), and the economy (business, markets, finance, and economics). In a sense this binary positioning reflects the global-national tensions alluded to above, where elements of society are questioning the benefits of globalization.

The pandemic has affected different parts of the economy differentially. Those intimately concerned with globalization have been subject to the strongest constraints. Hence international air travel, shipping, and trade have all suffered. Activities involving the congregation of people have also suffered, while those involving home delivery of products and services, or medical and pharmaceutical activities have prospered. It is likely that small businesses and the self-employed are more vulnerable now, while in the future it is probable that capital-intensive industries that need high levels of capacity utilization will also be vulnerable. However, in terms of the scenarios, the notion of weakness in business and the economy relates more to general macro-economic conditions where shortage of capital, weak demand, and fragile supply chains mean that the assumptions that underpin day-to-day business activity may no longer apply.

If civil society is weaker in the post-COVID-19 period, then it is possible to envisage two broad outcomes. In the first outcome, when capitalist economic structures remain intact and when stimulation measures are successful there is a broad return to “business as usual,” along with the prevailing trajectories on carbon emissions, pollution, resource consumption, and other indicators of ecological stress. This scenario can be equated to neo-liberal economics and the free market system, albeit with multiple national variations. In the second outcome, a weak civil society coupled with frail business and economic systems brings the prospect of “chaotic transition” wherein there will be a rapid but unorganized system rebalancing around much

lower levels of wealth creation and material consumption. This theoretical position is compatible with a “doomsday” or “catastrophe” perspective, for example, seen in fears of a nuclear winter in the event of an all-out nuclear war (Baum et al. 2015; Coupe et al. 2019)

If civil society is stronger in the post-COVID-19 period, there will be enhanced legitimacy to pursue civil and social agendas. The primacy afforded to business and the economy is eroded. Hence, the ability to constrain ecological burdens becomes possible. Again, there are two variants that can be envisaged. With business and the capitalist economy still intact, and materialism generally still supported, the COVID-19 pandemic could provide the conditions for a renewed and global “green new deal” centered on sustainable consumption and the circular material economy. This perspective is compatible with theories on green growth and the de-coupling of ecological burdens from economic activity (Stoknes and Rockström 2018). Alternatively, a more radical vision for societal futures would result in the deliberate shrinking of the material economy in the form of a managed contraction of economic activity. This final scenario is compatible with the theoretical perspective of degrowth (Kerschner et al. 2018). These scenarios are discussed below.

Four scenarios for a post-COVID-19 world

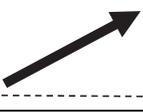
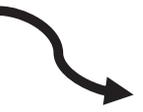
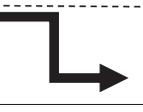
Despite decades of innovations for enhanced sustainability, and multiple governmental regulatory interventions, the burdens imposed on the global ecological system have increased over time (Cohen

2020). In consequence, there has been a growing interest in understanding the barriers to transition, and the enabling of potential pathways in transitions, especially but not exclusively with respect to energy (Pregger et al., 2019). Osazuwa-Peters et al. (2020) for example argue that risk as understood by local citizens is critical in evaluating alternative energy supply and hence is a predictor of pathway choice. An event such as COVID-19 is of such a magnitude as to foster a reevaluation of risk in many aspects of society.

In principle, transitions theory can inform the construction of alternative scenarios, which can then be used to generate illustrative outcomes (McDowall 2014; Angheloiu, Chaudhuri, and Sheldrick 2017). Nonetheless, a concern with validation of this type is that unforeseen or unprecedented events may occur, and these may be precisely the “regime changing” occurrences that could have a significant impact on future outcomes. Scenarios are inevitably also concerned with multiple agents of possible change, and of interactions between agents (Tavasszy, Ivanova, and Halim 2015; Zukunftsinstitut 2020). It is recognized in the transitions literature that there are competing visions for the future (Geels et al. 2015). In this policy brief, we seek an explicit exploration of those competing visions through scenarios.

The scenarios are not “good ideas gone wrong.” Rather, they are intended as coherent visions of the future linked to distinct theoretical positions in the literature. Four scenarios are defined in this contribution and summarized in Table 1 using the MLP framework.

Table 1. Scenarios for shipping using the MLP framework.

<i>Scenario</i>	<i>Landscape Level</i>	<i>Regime Level</i>	<i>Niche Level</i>	<i>Ecological Burdens</i>
Business as usual	Steady global GDP growth; reductions in ecological burdens in some sectors creating “headroom” for others.	Growth in regime scale, but overall stable membership of regime actors and agents.	Some niche technology developments in specialist applications	
Managed transition	Green growth strategy; de-couple resource consumption from GDP; reduced material consumption per capita.	Stronger regulation and policy toward resource consumption. Regime actors remain, but scale is reduced over time.	Strong encouragement of emergent technologies and fuel-efficiency measures.	
Chaotic transition	Environmental, economic, and political collapse on a global scale	Collapse of intermediary governance organizations.	No new technologies or operational practices.	
Managed degrowth	Chronic material shortages; strong regulation at international level; rapid restoration of some environmental degradation.	Sequential deconstruction of main regime actors and participants.	Potentially significant innovation in alternatives to existing production and consumption.	

Business as usual

The return to the business-as-usual scenario includes the idea that attempts are made to return economies and trading relations to “normal” even though in reality there might be a protracted period until that normality is achieved. Therefore, trends in evidence before the COVID-19 pandemic will recommence, and future changes of significance are incremental and readily forecastable (Hickman and Banister 2007). It is underpinned by the neoclassical economic concept of optimization (Grubb, Hourcade, and Neuhoff 2015). The scenario anticipates that global trade broadly persists, and that debt-enabled material consumption continues to underpin economic growth measured in GDP. The socio-technical regimes continue to be self-regulating, while landscape-level pressures are not so profound as to demand drastic and enduring changes. Technological innovation and “normal” competition continue to result in eco-efficiencies, but such efficiencies are largely negated by continued growth in overall consumption. This is a contentious scenario, as there were prior to the COVID-19 crisis indications of structural overcapacity in key activities such as shipping (Morley 2016; SMEA, 2017; IHS Markit, 2015). There was also an emergent discourse on the failure of globalization (Flew 2020). This scenario therefore assumes that protectionist forces are subdued by the situation after the pandemic, and that the economic benefits of global integration are accepted as the best way forward. This scenario is expressed by the World Trade Organization (WTO) which in April 2020 anticipated a significant fall in global trade of 13–32% in 2020 compared with 2019, but then with a resumption to year-on-year growth (Walker 2020; WTO 2020; see also IMF 2020).

Managed transition

This scenario represents the ecologically helpful restructuring of economies with technology delivering more sustainable production and consumption (Geels 2014). Ultimately the scenario implies the successful establishment of circular economic systems that in turn require reduced consumption of fossil fuels and other natural resources. There would be a genuine de-coupling of material and energy consumption from economic prosperity (Stoknes and Rockström 2018).

Managed transition therefore also embraces the policy position of “green growth” being delivered by both public and private sectors, working in partnership despite the non-linear and unpredictable character of the changes to the socio-economic system that would have to be endured (Capasso et al. 2019). The scenario still envisages a significant role

for companies that can bring to bear significant competencies, skills, technological prowess, and financial resources (Ansah and Sorooshian 2019). In this respect, managed transition is the logical development of the “Porter hypothesis” that states that strong state regulation for environmental and other reasons is beneficial to companies (Wang, Sun, and Guo 2019). Nonetheless, managed transition for reduced resource intensity also implies the rapid decommissioning of much invested capital in a negotiated process involving multiple nation states, international bodies, and other key actors. Hence this scenario assumes that the regulatory and governance mechanisms of globalization remain intact, even if the economic mechanisms are reduced, such that there remains a global consensus on the need to be above narrowly nationalist and isolationist policy actions.

The COVID-19 outbreak may act to “kick start” the process of managed transition in that regime actors could change behaviors relative to the business-as-usual scenario. The overall result is an accelerating process whereby carbon emissions and other ecological burdens are reduced, before stabilizing around a new regime structure. Sustainability burdens in total are thus substantially below the business-as-usual scenario, but still end up higher than the latter two scenarios.

Chaotic transition

At the level of individual societies, history is replete with examples of catastrophic collapse from diverse causes (Tainter 1988). These cases have all been spatially bounded rather than global in scope, and may have resulted in the large-scale dispersal of the affected populations as migrants or refugees, as frequently happens in times of war. Countries or societies that have endured calamitous events of this magnitude may struggle to recover.

Prior to the arrival of COVID-19, the prospects for a global scale catastrophic event appeared to be confined to nuclear war, which could result in sudden and widespread devastation. In contrast, the ecological crisis brought on by encroaching on planetary limits has been seen as somehow less existential, less immediate, and less comprehensive. As Taleb (2007) has previously argued, significant discontinuous events are notoriously difficult to forecast, and partly for this reason their impact is particularly acute (Turchin 2008, 2016; Blyth 2009). Chaotic transition may result from landscape pressures manifest across societies and their economies (Motesharrei, Rivas, and Kalnay 2014; Motesharrei et al. 2017).

Yet the prospect of a collapse of the global economic order is not now so far-fetched. Even prior to the COVID-19 pandemic there was some evidence of a process of disengagement and isolationism for example as pursued by the United States since the 2016 election (see, for example, BBC 2018). In this scenario the tension between a faltering globalization and a resurgent defensive nationalism leads to the fragmentation and ultimate collapse of global regulation and governance mechanisms. Furthermore, as has already been made evident from the short-term impact of the crisis, the result of economic collapse is also a concomitant reduction in ecological burdens. Hence, the COVID-19 outbreak could be the “trigger event” that cascades repercussions through the entire socio-technical system, and be of such a scale and pace that prevailing regulation and governance tools are unequal to the task of stabilization.

Managed degrowth

In managed degrowth the deliberate aim is to reduce an economy in scale (Kallis 2011). It is argued that landscape pressures can only be resolved by drastic de-consumption, and a rejection of materialism as a measure of economic success. Economic growth is incompatible with ecological sustainability, but ultimately requires socialism (Kallis 2019). One of the principal issues in this scenario is the balance between managed degrowth in developed economies and the need for economic growth in developing countries. Developing nations are likely to see degrowth as a first-world problem, and such an approach will require a careful balancing or rebalancing of the global economy. Managed degrowth therefore implies that global structures and co-operation remain intact, even if globalization as a neo-market concept ceases to exist. A much higher degree of national autonomy is likely.

The overall characteristics of each scenario for the post-COVID 19 future are summarized in Table 1 using the MLP framework.

Discussion

Under “(return to) business-as-usual” conditions, ecological burdens will continue to rise as global structures of production and consumption return. Governments and international agencies are already taking extreme measures so that economies do not collapse, a return to “normal” life will be possible. Recovery of stock markets and other financial institutions to pre-COVID 19 levels will at best take a period of years. So, the return to business as usual is likely to include a short-term reduction in carbon

dioxide (CO₂) emission levels (as an example), as also occurred during the 2008–2009 financial crisis, before the long-term trend line returns with growing pollution (see, e.g., Jonkeren, Jourquin, and Rietveld 2011). Moreover, the desire to restart economies could result in the postponement of ongoing carbon-reduction regulation and other environmental measures, including in shipping. It is already apparent that the COVID-19 crisis has precipitated fractured relationships within socio-technical systems at landscape and regime levels. The established agents of global stabilization such as the World Trade Organization, World Bank, United Nations, World Health Organization, and Intergovernmental Panel on Climate Change had, prior to the emergence of this virus, seen an erosion of their legitimacy and viability. The danger here is that without such checks and balances, the return to business as usual will accelerate the ecological crisis.

Under the other three scenarios, it is suggested that there is room for optimism, provided the very real social and political hurdles can be surmounted. It may be considered that chaotic transition and managed degrowth are less likely than managed transition or a return to business as usual. However, an event of this magnitude throws forth multiple unanticipated repercussions. Here, the issue of time is very important. The longer that the crisis endures, the more distant a return to business as usual becomes. Countries are differentially positioned, being more or less wedded to the global economy, more or less able to enhance self-reliance, and with affinity to materialism in general. These dimensions are likely to determine the pathway adopted hereon.

In the “Managed Transition” scenario, decoupling resource consumption from GDP, greater global political consensus, stronger regulation and policy toward business, and encouragement of emergent technologies are likely to lead to a net decline in ecological burdens (Geels et al. 2015). As noted above, this scenario requires strong cooperation between the existing regime constituents around a form of global “new green deal.” It is notable that interest in green growth emerged following the global financial crisis of 2008–2009, with notable institutions such as the Organization for Economic Co-operation and Development (OECD) seeing the strategy as a twin economic and ecological solution (Girouard 2011; Borel-Saladin and Turok 2013; Ferguson 2015). Prior to emergence of the COVID-19 pandemic there was a growing perception that green growth was failing to deliver the required pace and scale of carbon-emissions reductions at national or international level (Zhang 2015).

In the “Chaotic Transition” scenario, which was first proposed by Meadows et al. (1972) in the

context of global resource depletion, the environmental, economic, and political systems collapse at a global scale. In consequence, this would bring about a return to isolationism, and widespread business failure, with little or no innovation, which would in turn result in significant reductions in ecological burdens (Tainter 1988). This scenario is evidently highly disruptive, with potentially cataclysmic impacts on societies around the world and myriad secondary impacts such as mass migrations and large-scale conflicts. This sort of transdisciplinary scenario is described as Cliodynamics by Turchin (2008).

Finally, in the “Managed Degrowth” scenario, global material shortages, stronger regulation at an international level, and innovation in alternatives to conventional economic growth would lead to a rapid decline in ecological burdens before a steady state at a lower level occurs (Kallis 2011). In this scenario the “new normal” is a radical rebalancing of work, production, and consumption with prevailing themes of dematerialized lifestyles, shared work, green taxes, and the erosion of private wealth (Kallis 2017). Over time, a shift in emphasis toward re-use and recycling will drive down net resource consumption.

Conclusions

The stridency of pro-market political and institutional voices on the importance of getting economies “back to work” is indicative of the magnitude of the challenge posed by the COVID-19 pandemic to the prevailing order. Yet the prevailing order was already under some threat as collective institutions were struggling to retain legitimacy and cohesion in the face of powerful economic and social contradictions (Müller 2017). Nationalist and de-globalization sentiments from both the traditional left and right wings of the political spectrum were in evidence (Heinisch, Werner, and Habersack 2020). As this policy brief argues, there is a multiplicity of alternatives available. The scenarios are caricatures. The future is likely to contain elements of several of them and will be heavily dependent upon the historic legacy and specific endowments of different countries.

The almost universal retreat into a defensive nationalism does not auger well for a managed transition, despite the breathing space afforded to ecological system by this hiatus in economic activity. With so much manufacturing, logistics, distribution, and retail capacity lying idle, and with so many people suffering reduced wages or unemployment, the short-term benefits of “business as usual” will be compelling. Yet there are also positive signs. Public

health services have rarely been so highly valued and appreciated. The general willingness to accept the privations and restrictions of “lockdowns” shows an underlying sense of community, collectivity, and public spirit. Many businesses demonstrated an ability to produce socially useful products at surprisingly short notice. Some of the societal risks of globalization have been recognized. Perhaps individuals have come to appreciate that less money and more time is a good thing. Most importantly, there is a palpable sense we have agency, we can change, and that different futures come from making different decisions in the present.

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