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Industrial Policy for Sustainable Human Development in the post-Covid19 era

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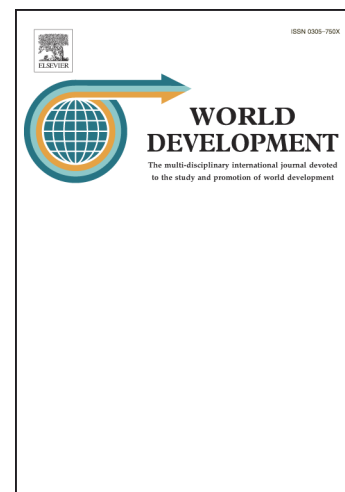
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Industrial Policy for Sustainable Human Development in the post-Covid19 era.

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Abstract

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Within an inevitable revamping attention on the need for government intervention to face the challenges raised by the Covid19 pandemic, industrial policy is appearing as a central piece of the puzzle. As production dynamics in every country is highly affected by the crisis, industrial policy is considered part of the response to solve dramatic economic and social problems deriving by extraordinary levels of unemployment, deprivation and poverty.

In this paper, we argue that a turning point on the connection between industrial policy, sustainability and development has been reached, highlighting the need to rethink its theoretical foundations as well as its governance and implementation processes for a new role in our post-Covid 19 societies.

Therefore, the research question underlying this paper deals primarily with the nexus between the debate on industrial policy and its effects in terms of human development, social cohesion and sustainability. For this reason, we attempt at closing the gap between different strands of literature, whose integrated connection leads to a new analytical framework with real-world implications on the role of industrial policy, not only as tool for productive dynamics, but also as a leverage for sustainable human development.

All in all, we aim at contributing to the debate on our post-Covid19 economies and societies in two ways: firstly, by providing a new integrated analytical framework on industrial policy to steer a sustainable

structural change of our economies and societies towards sustainable human development; secondly, by identifying preliminary implications on industrial policy governance and implementation, investing in the accurate and transparent design of industrial policy in the post-Covid19 era.

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1. Introduction

National and local societies all around the world are fighting the most dramatic global public health emergency of our time, which has soon become an economic, social and human crisis (Guterres, 2020) touching all the key dimensions of our lives. The vibrant international debate on the Covid19 pandemic – and particularly on consequent challenges and opportunities in the medium and long run – has pointed to four arguments that appear central for the discussion about past, present and future trajectories of development and sustainability.¹

Firstly, there is wide consensus the pandemic is exacerbating several problems of our economies and societies, which were serious and evident well before it (Anand et al., 2020; Fleurbaey, 2020; Mazzucato, 2020; Sen, 2020; WEF, 2020a). Increasing inequality within and across countries, multidimensional poverty conditions for millions of people and unsustainability of modern production and consumption patterns have coupled with atrophying in the capacity of state institutions (Acemoglu, 2020), resulted from the policy prescription of neoclassical economics (Chang, 2001 and Reinert, 2012, among others) and their unwarranted reliance in the invisible hand of the market.²

Secondly, the differential impact of Covid19 in terms of class, generations, social groups, territories and countries is undeniable and it has only begun to reveal itself (Harvey, 2020; OECD, 2020a; Piketty, 2020 Stiglitz, 2020). This particularly concerns the most vulnerable social groups and economies that were already at risk (Venkatapuram, 2020).

Thirdly, the dramatically high human costs inflicted worldwide by the pandemic urge us to make fundamental changes to our economic and social systems (Hepburn et al., 2020; Mazzucato, 2020; Piketty, 2020). The current state of emergency offers the opportunity to place social resilience³ and environmental consciousness firmly at the centre stage for decision-making processes, and to redefine the paradigm on the connection between production dynamics, wellbeing and sustainability.

Fourthly, in a similar vein the pandemic seems offering an opportunity to rethink of “what governments are for” (Mazzucato, 2020), proposing a new and different framing to structure government intervention properly to serve the public interest. Indeed, the magnitude of the crisis has required governments to step in, shouldering more responsibilities to keeping all people, households and businesses afloat (UN, 2020)

through substantial targeted fiscal, monetary, and financial measures aimed at containing the spread of the virus, strengthen health care systems, boost confidence and demand, and limit adverse supply effects (IMF, 2020a; OECD, 2020a).

Within such inevitable revamping attention on the need for public action and government intervention, industrial policy can be considered a central pillar of the recovery strategies. As production dynamics in every country are highly affected by the crisis, industrial policy should be part of the response to solve dramatic economic and social problems deriving by extraordinary levels of unemployment, deprivation and poverty. Many national and sub-national governments are clearly promoting actions targeting their productive sectors to keep economies on 'life support' (WEF, 2020a) and to keep intact the economic infrastructure of society (IMF, 2020a). Moreover, the pandemic is emphasizing the strategic nature of certain sectors (e.g. health, agrifood, logistics, ICT) and it is forcing a quick shift towards specific types of production (e.g. health-related devices and services).

In this paper we argue that a turning point on the connection between industrial policy, sustainability and development has been reached, highlighting the need to rethinking the theoretical foundations of industrial policy, as well as its design and implementation processes for a new role in our post-Covid 19 societies.

Traditionally, industrial policy has been foremost aiming at enhancing firms' productivity, sector and innovation performances, in order to favour productivity and competitiveness, conceiving an implicit trickle-down approach⁴ about its effect on people and quality of life. Here, we discuss to what extent future industrial policy can represent a direct leverage to promote sustainable structural changes based on human development, social cohesion and sustainability, calling back into question the meaning and vision of development (Seers, 1969; Ingham, 1993) toward which both developed and developing countries strive.

In order to achieve this objective, we attempt at closing the gap between different strands of literature that, despite having so far evolved separately, provide relevant arguments for a new framing of industrial policy and call for being integrated in a systematic way. Indeed, we believe that without an appropriate analytical framework with real-world implications, policy-makers would be left without theoretical foundations supporting the design and implementation of industrial policy for social cohesion and socio-economic progress, with the subsequent risk of exacerbating government failures. This represents an undeniable high

concern at times requiring extraordinary interventions to ensure social resilience and measures to protect people, households, ecological systems and business and to steer them towards a new development model.

The paper is structured as follows. After this introduction, the second section reviews the evolution in the debate on industrial policy and identifies recent discontinuities that are leading to a potential turning point. The third section briefly discusses insights drawing from real-world experiences of industrial policy and potential changes in the post Covid-19 scenario. The fourth section presents the six theoretical pillars that are combined, in the fifth section, in a new analytical framework. The sixth section deals with the implications for industrial policy governance and implementation. The last section concludes with final remarks.

2. The evolution of the debate on industrial policy

2.1 The industrial policy debate

Industrial policy is a wide-ranging concept,⁵ whose long-lasting debate has been firmly rooted in the old arguments for and against government intervention, both legitimized and motivated by an opposite rationality of failures (Chang, 1996; Peneder, 2017). Supporters of industrial policy mould the common rationale of ubiquitous market failures (Bator, 1958) to favour the provision of public goods and the management of externalities, as well as to limit the societal risks deriving from imperfect and incomplete markets and from imperfect and asymmetric information, leading to adverse selection and moral hazard. Conversely, opponents of industrial policy stress the arguments of omnipresent government failures, highlighting risks of regulatory capture by partial interests and rent-seekers' pressures, potential government inability to overcome important information asymmetries to properly identify targets and tools to achieve determined goals, and potential internal management problems due to bureaucrats' limited capabilities and personal interests (Tullock, 1967; Krueger, 1974).

In the past decade, the debate has become "far less ideological and thus more productive" (Chang and Andreoni, 2020, p. 325)⁶ and a renewed interest in industrial policy has put it back on the central scene of the academic and policy-making debate in many parts of the world (Cimoli et al., 2009; Bailey et al., 2015; Aiginger and Rodrik, 2020; Chang and Andreoni, 2020; Oqubay et al., 2020). Already before the Covid19

pandemic, a ‘industrial policy rejuvenation’ (Stiglitz et al., 2013) or ‘renaissance’ (Mazzucato et al., 2015) was apparent due, at least, to three reasons.

Firstly, the widespread recognition that industrialization processes are essential for the transformation of the economy as a whole, and the subsequently growing appreciation of the relevance and pertinence of proactive industrial policies to promote desired structural changes (Bianchi and Labory, 2006, 2011; Chang, 1996, 2003; Di Tommaso et al., 2013; Stiglitz and Lin, 2013; UNIDO, 2017) by diversifying and upgrading economies beyond simply freeing up markets (Aiginger and Rodrik, 2020).

Secondly, the necessity for national and subnational industrial systems to reduce the risks and exploit the opportunities connected to globalisation processes – particularly concerning global value chains and the international division of labour (Mehrotra and Biggeri, 2007; Pietrobelli and Rabellotti, 2011; Pipkin and Fuentes, 2017) – and disruptive technological changes – particularly automatization, digitalization, industry 4.0, and the Internet of things (Bailey et al., 2019).

Thirdly, economic downturns in the aftermath of the global financial crisis and the ensuing Great Recession have partially pushback against the market-fundamentalist approach, which led to mis-investment in the non-tradable sector at the expense of growth-rich tradables (Aghion et al., 2011) and to a limited contribution to delivering long-run, inclusive and sustainable prosperity (Bailey et al., 2015).

Such revamping interest in industrial policy has two facets.

On the one side, it represents a sharp departure from the neo-liberal economic model, which had become entrenched in socio-economic policy-making since the late 1970s. According to Reinert (2006), neo-classical economics operates at a level of abstraction that is too high to capture the key factors recognised long ago as responsible for uneven development and polarisation of the world in growing wealth versus growing poverty and inequality. This has been calling for a qualitatively different way of thinking about economic (and particularly industrial) policy. However, Andreoni and Chang (2018) argue that from the mid- 2000s, supposedly original arguments justifying industrial policy are “rather clumsy translations of old ideas by non-Neoclassical schools into the Neoclassical language”, having led to several drawbacks and limitations of such mainstreaming of the industrial policy debate.

On the other side, long-term analyses have shown that – despite the neo-liberal rhetoric of its opponents – industrial policy has always been all around in high-income countries (including and primarily in the US,

several OECD countries and EU member states), as well as in Asian Tigers and BRICS, whose recent comparative success has given credence to the role of the state in economic development.

Nevertheless, what it is still widely firm about industrial policy implementation is conceiving it as a technical tool to achieve given goals, which are set from the outside of such debate. In other words, for both policy-makers and scholars the salient question is to assess the technical capacity, scale and effectiveness of all types of industrial policies to meet desired objectives. The discussion on these desired societal objectives underlying the design of industrial policy is often overlooked, generally pointing to productivity and competitiveness that in turn would allow for economic growth, higher incomes and socio-economic progress.

2.2 Four recent discontinuities

Relevant discontinuities have recently emerged within the international debate on industrial policy, linked to both theoretical advancements from different perspectives and to the disruptions derived from severe global shocks, such as the 2007-2008 financial crisis and the emergence of the Covid19 pandemic in 2020.

The first discontinuity deals with the scope of industrial policy. Recent conceptualisations and analyses⁷ are increasingly arguing that industrial policy is not just restricted to industrial / manufacturing production, but rather deals with all elements of contemporary production dynamics (including, for instance, agriculture and services and their interdependencies with the industrial sector). Moreover, it broadly points to a whole-of-government understanding of industrial policy to be holistically integrated with other complementary policy strands, such as competition, education and training, environment, research and innovation, health, employment, territorial cohesion, etc. (Aiginger and Rodrik, 2020). These arguments underline ‘systemic industrial policy’ (Aiginger, 2007) as an holistic approach that attends to both demand and supply considerations while encouraging industrial development, and coordinates several policy fields with production processes as its core, while affecting upstream and downstream industries, sectoral change, clusters, and networks (Aiginger and Rodrik, 2020).

The second discontinuity deals with the role industrial policy might have in governing and sometimes driving structural change, which is at the heart of a dynamic process of economic development (Ocampo, 2020). Contributions within the spectrum of new structuralist economics (Lin, 2012, 2017) envisage an explicit role for government intervention to reshape the industrial structure and the organisational

configuration of the production system, thus setting economic structures towards a feasible path of structural transformation and making them dynamic and capable of generating new waves of structural change. However, in this perspective industrial policy is also about governing the complex process of institutional building and change that accompany any process of structural transformation (North, 1990; Aoki, 2002; Chang, 1996, 2003; Di Tommaso et al., 2020a, 2020b).

The third discontinuity deals with overcoming the canonical rationalities of failures to justify or contest government intervention. According to Peneder (2017), the peculiar dependence on rationalities of failure⁸ originates in the economists' habit to accept hypothetical perfect states as normative benchmarks, inherited from the canon of static welfare optimization. However, these normative benchmarks are ill defined, especially in the dynamic and open systems of a globalized world (Peneder, 2017), which is a feature made even more evident by the global diffusion of the pandemic since its localized emergence in Wuhan.

The last discontinuity switches the attention from what failure a policy must rectify, to what it aims to achieve. This is introduced by linking the structural transformation of economies to the structural transformation of societies, letting new societal and environmental challenges to raise "questions about industrial policy as it shapes the structure of economic activity more generally" (Aiginger and Rodrik, 2020, p. 3). Undoubtedly, the debate on green industrial policy (Aiginger 2013; Rodrik, 2014; Altenburg and Assmann, 2017) has been at the forefront of this discontinuity, having explored – both in theory and practice – industrial policy options for managing structural change that accounts for both the productivity and the environmental challenges in a harmonised way, overcoming potential trade-offs (Altenburg and Assmann, 2017). Indeed, placing environmental sustainability on the centre stage and as a potential driver of growth has led industrial policy by several national governments (Rodrik, 2014; Mathews, 2020) and international organisations (e.g. UNIDO, UNCTAD, UNDP) to increasingly deal with fostering new, clean energy technologies, ultra-low carbon technologies and higher energy efficiency, in order to decouple industrial development from resource depletion, pollution and waste production.

Nevertheless, an integrated and indivisible concept of sustainability has been recently consolidating (Purvis et al., 2019; Biggeri and Ferrannini, 2020), combining environmental concerns and awareness on planetary limits to growth with both people's inclusiveness, equality of opportunities and wellbeing, and with shared and long-term societal prosperity (including, but not restricted to, income growth). This is clearly embedded

in the Agenda 2030 for Sustainable Development (UN, 2015),⁹ which embraces “the so-called triple bottom line approach to human wellbeing” (Sachs, 2012, p. 2206) by balancing the three dimensions of sustainable development, i.e. the economic, social and environmental. Its universality makes it critically relevant both for developed and developing economies to harness the full potential of industry’s contribution for lasting prosperity for all. However, such integrated notion of sustainability does not seem to have been fully reflected yet in the academic debate and in the real-world practices of industrial policy.

If taken together, these discontinuities remark the need for a decisive turning point centred on the recognition that national and sub-national governments can shape the future of their societies by designing and implementing industrial policies able to simultaneously steer a structural transformation of their economies and societies.

3. Insights from the real-world

The evolution and discontinuities in the international debate on industrial policy are apparent when looking at the variety of government intervention models on production dynamics long before the Covid19 pandemic.

The historical experience of industrial policy in China, the United States, and the European Union is illustrative of the role by governments with regards to industrialization as a more general driver of the transformation of the economy and society in the long-run.¹⁰

In China¹¹, an industrial policy approach characterised by long-term planning and experimentation was envisaged to accompany a gradual shift of the economy and society to a capitalist model with Chinese characteristics, and it is today framed within the ‘Harmonious-society’ vision.¹²

In the US¹³, despite the continuous emphasis on the strengths of free markets in guiding the country’s destiny, industrial policy over time was composed by actions motivated by short-term economic, social, and political necessity, along with more ambitious interventions aiming to achieve more complex structural adjustments and consolidate an American model of the society, as defined by economic powers and interests.

In the EU¹⁴, concerns over production dynamics and de-industrialisation at both aggregate European and member states level¹⁵ within a changing global context have always deserved a central attention, with a

varying of policy frameworks on industrial policy over time mostly characterised by a mixed approach (i.e. incorporating both horizontal and sector-specific measures). Recent industrial policy in the European Union has embraced – at least in its mandate and statements – a wider societal perspective, leading to the “European Green Deal” (EC, 2019) that shapes the new European industrial strategy to transform EU’s economy for a sustainable future.

These real-world industrial policy practices highlight – and have in common – the four discontinuities mentioned in the previous section. First, the scope of these experiences of industrial policy has definitively gone beyond a primary or unique attention to the manufacturing sector, and it has been centred on stronger integration among different policy fields. Second, it could be argued from these experiences that industrial policy is primarily about promoting and governing structural change in an attempt to reach a number of different economic and societal goals. Third, the rationales supporting these government interventions go well beyond the simple correction of certain failures. Fourth, industrial policy has been often associated with direct government intervention on production dynamics to promote both economic growth and broader development objectives: namely, growth, competitiveness, productivity, but also job generation and environmental sustainability.

Nevertheless, while it is undeniable in these cases industrial policy has been used well beyond market failures’ correction, the ability to fully place human development, social cohesion and sustainability at the very centre of such industrial policies can be questioned (Oqubay, 2020). Such questioning becomes even more urgent in the post-Covid19 era (Anand et al., 2020), as preliminary economic outlooks report the collapse of global activity, uncertain recovery paths, impressive increases in unemployment, rising public and private debt, exacerbated inequality and greater global fragmentation (OECD, 2020b; IMF, 2020b).¹⁶

Among others, the international debate is devoting particular attention to two potential changes in the global industrial and technological landscape.

First, the significant disruptions in GVCs have been amplifying the pre-existing concerns over the continued viability of organizing the production of goods and services through GVCs (Oldekop et al., 2020). On the one side, this is providing stronger support to industrial sovereignty and it may lead to further growing protectionism and nationalism; On the other side, these disruptions are calling for rethinking and improving resilience in global supply chains for the future and reorienting business approaches towards ‘risk

competitiveness' (instead of cost-competitiveness) (OECD, 2020c; WEF, 2020b). Whatever the future trends, it is clear the restructuring of value chains will have crucial implications not only for the international division of labour, but also for inclusion and sustainability concerns (Oldekop et al., 2020).

Second, the pandemic has significantly – and in some cases suddenly – accelerated digital transformation in all sectors, showing that advanced technologies and a digital-first mindset to a physical business (whenever appropriate and feasible) are necessary as the global marketplace will require more agile and flexible production systems and supply chains (WEF, 2020c). More in general, data would surely become one of the most significant economic assets, but such an increased reliance on digital assets would also enhance potential issues of digital justice and equity for individuals, firms, communities and countries (Oldekop et al., 2020).

Moreover, some neglected issues in the theory of industrial policy – namely, according to Chang and Andreoni (2020), reliable commitments under uncertainty, learning in production as ultimate driver of industrial dynamics and influence of demand management on the conduct of industrial policy – would become even more central. Their relevance would potentially increase within a global scenario characterized by increased uncertainty for the next future, new trends and power relations in value chain internationalization processes and revamping attention of fiscal and monetary policies to boost the recovery.

Finally, taking into account these potential implications of the pandemic, Oldekop et al. (2020) argue the need for a global development paradigm able to foster a transformative change in all countries towards a more sustainable and equitable world. They highlight that Covid19 adds even more immediacy to face key sustainability challenges and patterns of inequality through a multi-scalar approach, taking into account the interconnectedness of our economies and societies.

However, when combining the common insights from real-world policy practices with the potential implication the pandemic might bring, we observe the partial inability of established theory in explaining the reasons for a wide range of industrial policy interventions to tackle the societal challenges of our present, especially in light of the debate on the post-Covid19 scenario.

4. The theoretical pillars for a new integrated framework

Based on our previous arguments, it appears necessary to build a new analytical framework with real-world implications to rethink industrial policy as leverage for social resilience and human development, in order to simultaneously advance the academic discussion and inform the policy-making debate at all levels.

Going beyond the mainstream theoretical foundations on industrial policy, our framework draws from six streams of literature and approaches, which a) similarly point to a new directionality on industrial policy, but b) have so far been connected to one another only to a limited extent.

Without any intention of exhaustiveness, for each theoretical pillar we highlight those arguments that are pushing the current and future debate towards a stronger connection between industrial policy, sustainability and development to steer the structural change of our societies. As it will be discussed later, our framework starts from well-known theoretical rationales and foundations of industrial policy (which have been increasingly consolidated in the literature as a result of the recent discontinuities in the debate). Then, it combines them – with each playing a specific role and contribution – and it suggests a unifying linkage with a sustainable human development paradigm as a main element of novelty.

4.1 Goals, targets and tools of industrial policy (Th1)

The current international debate on industrial policy is devoting increasing attention to the relation between goals, targets and tools (Di Tommaso and Schweitzer, 2013), which shapes the government ability to effectively translate general objectives in concrete and specific industrial policy programs (Chang, 1994).

The proper choice of particular targets and tools depends first and foremost on the societal goals to be pursued, and this implies discussing and finding a general agreement about the political priorities to be promoted (Di Tommaso et al., 2020a), and ensuring a consistent relation between goals, targets and tools (Di Tommaso and Schweitzer, 2013).

In this regard, the current debate is shaped by the recognition that economic growth is an essential part, but not the entire structure, of development and that the quality of growth matters, because historical evidence has shown there are different types of unsustainable growth: jobless growth, ruthless growth, voiceless growth, and futureless growth, (UNDP, 1996), but also peaceless growth (Fukuda-Parr, 2007) as well as

healthless growth, as the Covid19 pandemic has shown. Moreover, a more comprehensive and societal understanding of competitiveness as a driver of Schumpeterian development is gaining momentum, in which high real incomes are associated with qualitative changes of the socio-economic system (Peneder, 2017).

However, this scenario opens new puzzles for industrial policy, not least because i) societal objectives risk being in conflict with one another, showing the existence of potential trade-offs (Biggeri et al., 2019), and ii) identifying and selecting particular targets able to respond to societal goals is a controversial issue in any policy design process, whose answer is not easy to attain (Di Tommaso et al., 2020b).¹⁷

This already complicated framework becomes even more difficult when considering societal priorities different from economic growth, such as the ones made evident by the Covid19 pandemic.

4.2 The new framing of innovation economics and policy (Th2)

Similarly, within the extensive debate on innovation economics and policy, a new framing on research and innovation to accelerate transformative changes towards a more sustainable world is emerging.

According to Schot and Steinmueller (2018), a first framing (emerged explicitly after the Second World War) was based on the premises that science, technology and innovation are the basis for long-term economic growth (by sustaining improvement in factor productivity) and prosperity. Thus, the promotion of public and private R&D – regardless of its focus – through government investments and incentives and the commercialization of scientific discovery through intellectual property rights were necessary to overcome market failures (Nelson, 1959; Arrow, 1962). A second framing (emerged during the 1980s) was based on the premise that interactive learning processes and strong absorptive capacities are necessary to bridge the gap between science, technological discovery and application or innovation. Thus, the building of national, regional and sectoral systems of innovation through public-private partnerships and university-industry linkages become the central pillars of innovation policy focused on overcoming system failures (Freeman, 1987; Lundvall, 1992; Etzkowitz, 2008).

Nowadays, a third and new framing on innovation (emerged in the last decade) is based on the argument that environmental and social goals can be seen as strategic and dynamic drivers of long-term growth and prosperity, in order to drive the system towards the desired structural dynamics of our economies and societies. This is coupled with the need to overcoming transformation failures (Weber and Rohracher, 2012),

highlighting that significant advances in technology have not truly resulted in disruptive innovation and systemic change to build more sustainable and inclusive societies for all. Thus, the use of science, technology and innovation for meeting social needs (e.g. ensure public health, ending poverty and reducing inequality in all its forms everywhere) and tackling environmental challenges (e.g. climate change, energy transition and circular economy) gained prominence in policy and academic debate, especially in light of the Covid19 pandemic. Moreover, civil society and citizens became to be conceived not simply as consumers and adopters of innovation, but also as sources of new ideas and solutions, as well as drivers of organizational and business model changes and of new collaborative processes and partnerships for innovation.¹⁸

A greater directionality in innovation policy fostering a sociotechnical transition towards sustainability is often connected with a mission- or challenge-oriented approach (Mazzucato, 2016), which is operationally translated into new public missions. They sit between broad challenges and concrete projects (Mazzucato, 2018), shaping and creating markets – rather than just fixing them – to solve concrete societal challenges (Mazzucato et al., 2019).

4.3 Values and institutions in a social economics perspective (Th3)

The literature on social economics¹⁹ and its study of the ethical and social causes and consequences of economic behaviour, institutions, organizations, and policy provides an undeniable support for our analytical framework. Indeed, social economics highlights the relationships between the economy and society, and particularly that “economic values cannot be separated from social values, and that economic relationships are framed by broader social relationships” (Davis and Dolfmsa, 2008, p. 2). Among others, three arguments from this literature have been made apparent by Covid19 pandemic and are worth being highlighted here.

First, despite the neglect in mainstream thinking about the role of societal values, it is increasingly evident that governments adopt belief systems and values that shape and define their policies, thereby influencing the transformation of their economies and societies (Davis and Dolfmsa, 2008).

Second, it is fundamental to problematize and engage with the notion and role of the state in economic and societal processes, also by overcoming the separation between the public and the private sphere

(Dannreuther and Kessler, 2008) towards a systemic and evolutionary institutionalism perspective (Elsner, 2014).

Third, social economics scholars devote attention on what economic conditions are mandatory for a good society and how can they be achieved, along with how different social institutions contribute to a sustainable, just, and efficient economy. This argument points to a crucial challenge about industrial policy in our current time, that is finding ways to ensure that government intervention is effective and efficient in pursuing societal goals, recognizing that the problem is not *whether* to intervene, but *how*.

4.4 *The political economy of industrial policy (Th4)*

The discussion on how to intervene – or, in other words, how to design industrial policies – clearly calls the political economy perspective²⁰ into our framework, as it has long casted doubts on the idea that “social improvement may derive from a preordained tendency towards social advantage or improvement rather than from purposeful human organization” (Reinert, 2018, p. 137), as emerged through an historical approach to political economy.

Therefore, greater consideration to the structural political economy approach (Cardinale, 2018) and the dynamics of decision-making processes shaping industrial policy should be paid in each context (Andreoni, et al., 2019).

Firstly, industrial production systems should be conceived as multi-layered arrangement of interdependencies among a plurality of networked productive units, organisations and institutions, which shape and lead the structural process of production transformation (Andreoni et al., 2019; Landesmann and Scazzieri, 2012a and 2012b). This means that – as Simon (1951) notices – production organisations, not markets exchanges, are the main structures in which people (i.e. the polity and the society) are embedded and, therefore, that the governance of these organisations and systems are critical in guaranteeing their reproduction, inclusiveness, and sustainability (Andreoni et al., 2019).²¹

Secondly, industrial policy analyses cannot be reduced to a mere ‘technical problem’ within a market economy framework, with little (or no) attention – most often due to simplistic ‘good governance’ and ‘good business environment’ agendas – to any contextual and political economy considerations (Andreoni and

Chang, 2018), including the feasibilities of certain types of structural transformation and appropriateness of target priorities by governments.

Thirdly, framing industrial development as a political economy process (Kalecki, 1976) leads to recognising the political determination and dynamics of economic institutions and policies, which reflect choices made by the society at large or by some powerful groups in the society (Sen, 2013). In any specific industrial policy-making process we should increasingly appreciate the politics that lies behind policy processes, incorporating a sense of the power relations that shape the complex relationships between key players within a country's development policy process (Hickey, 2005). Indeed, these players may organise themselves to exercise their agency in order to protect and promote their interests, which may not necessarily be aligned to an envisioned structural change. In this regard, the political settlements framework (Khan, 2017, p. 639) argues "the distribution of power across organizations affected by particular institutions was usually the most important determinant of the path of institutional change, and the effectiveness of particular institutions."

Therefore, the conflictual aspects of institutions and the conflictual nature of the social transformations should not be ignored. In particular, industrial policy undeniable involves (and opens) manifest and latent conflicts – even more than other policies due to its selectivity nature (Chang and Andreoni, 2020) – that shape how the policy itself, and the society at large, should be organised (Hickey, 2005). Therefore, the political space of interests, power relations and conflicts underlying industrial policies should become the key focus, and the management of conflicts should become a central feature for its successful design and implementation (Chang and Andreoni, 2020), in order to avoid potentially reinforcing horizontal inequalities among social groups, classes and communities due to asymmetries in power structures and struggles.

From these arguments, it follows that industrial policy is also about governing the complex process of institutional building and change that accompany any structural process of production transformation.

4.5 Structural change of the economy and society (Th5)

The analysis of the change in the economic and societal dynamics governed by industrial policy is today expanding. In particular, a new light is shed by the debate on structural change, by combining theory of configurations and dynamics of structural constraints and opportunities, with history of human and policy actions driving the economies and societies along a specific trajectory.

Theories of structural change²² explain how economic dynamics entails changes across system components, among which the centrality of production processes is pivotal. Recent contributions in the theoretical debate (Cardinale and Scazzieri, 2018; Quadrio Curzio and Pellizzari, 2018) argue that structural change is to some degree open-ended, because existing structures open up a range of possibilities, but do not determine the specific actions taken therein.

In this regard, Luigi Pasinetti's 'separation theorem' (2007) distinguishes between a fundamental level of investigation that addresses the persistent and general features of an industrial economy, and a level of investigation addressing features of economic structures that are more contingent and likely to reflect specific historical and institutional contexts. Such a distinction highlights the open-endedness of structural constraints and the plurality of trajectories the economy may follow subject to any given set of productive interdependencies and institutional conditions, and depending upon the human actions (primarily including industrial policy) undertaken to drive the economy along a specific trajectory (Quadrio Curzio and Pellizzari, 2018).

In other words, interdependencies bring about a range of *feasible transformations*, which human actions may or may not take up depending on actors' objectives. Therefore, any explanation of structural change is bound to remain open-ended *ex ante*, because it is the manifold actions on which it is based that will activate a given path of change out of the many that are made possible by economic structures (Cardinale and Scazzieri, 2018; Landesmann, 2018).

Structural change is then what defines in the end a process of economic development, which unquestionably drives structural transformations in societies.²³ In this perspective, promoting economic development means encouraging the structural change of economies governing the interrelated structural change of societies (Di Tommaso et al., 2020a, 2020b). It is undeniable that processes of industrialization or servitization radically change the structure of the economy, but it is equally undeniable that they also modify the shape of the underlying society (UNIDO, 2017). These transformations change the living conditions of individuals, communities, cities and regions, nations. They produce radical modifications in individual and social behaviours, which also drive fundamental alterations in people's needs and demand for goods, services and rights.

4.6 Capability approach and Human Development (Th6)

The last theoretical pillar provides a vision and direction for the structural transformation of the society industrial policy may contribute to. Indeed, the Capability Approach and Human Development paradigm²⁴ has been central in robustly challenging a mainstream vision of development, distinguishing between the means and goals and thus questioning the vision of development in itself, its institutions and its processes.

The Capability Approach proposes a fundamental shift from concentrating on the means of living to the actual opportunities of living in itself, that is, human flourishing in terms of expanding the capabilities of people to lead the kind of life they have reason to value. In other words, being a people-centred approach derived from an agency-based and opportunity-oriented theory, it contributes to the conceptualization of the multidimensionality of development, and thus people's real freedoms in daily life are central to the development process.

It is important to remark that, since the seminal the contributions by Amartya Sen, the capability theories (Robeyns, 2016) have experienced an evolution over time, being still rooted in the theoretical foundations of the approach, but having also moved forward to further expand its original contribution to development thinking. Above all, several capability scholars²⁵ have contributed to overcoming the CA's excessive individualism and non-negotiable liberalism, by offering methodological, ontological and ethical arguments, arguing for greater attention to groups and collectivities, their capabilities, the structures of living together, in favour of a more communal ethos.²⁶

Similarly, the implications of the capability approach have gone beyond social policies, offering insights also to production processes (Mehrotra and Biggeri, 2005 and 2007) and innovation systems (Capriati, 2017), among others. According to both theoretical advancements and empirical evidence, it is clear that, on the one side, human development is deeply affected – both positively and negatively – by production dynamics; and, on the other side, expanding human capabilities, agency and empowerment requires dealing also with industrial development processes. In particular, industrial development and industrial policies are not neutral in terms of human development outcomes, as they deeply affect – either positively or negatively – the expansion of human capabilities.

This argument may lead to the identification of different trajectories of industrial development based on the interrelation between the economic and the social / environmental dimensions. In this regard, Mehrotra and

Biggeri (2005 and 2007) highlight the existence of different *roads* to industrial development, by including the often-neglected dimensions of social outcomes and environmental protection (such as social protection and quality of labour conditions offered in industrial systems). For instance, when many workers receive no social protection and may be exposed to deep health risks, and/or when informal activities are pervasive, industrial development processes might follow a path opposed to human development. Such perspective indicates that social outcomes, which include access to basic social services, social integration and participation and environmental protection, need to be complemented and not deflected by collective economic efficiency in industrial processes in order to obtain high levels of human development (Biggeri and Ferrannini, 2014; Biggeri, 2020).

4.7 A new integrated framework

All these different streams of literature are yet to be systematically connected and integrated in a new analytical framework with operational policy implications. Despite their respective theoretical roots belonging to different and often separated schools of thought, we have shown that relevant common arguments on the connection between industrial policy, development and sustainability have emerged from their different angles.

From the increasing debate on the goals, targets and tools of industrial policy (Th1), we learn the importance of ensuring their coherence and consistency to pursue value-based societal priorities. The emerging new framing on innovation policy (Th 2) underlines the need to continuously expand knowledge and innovation capabilities to promote sustainable and inclusive societies by tackling economic, social and environmental challenges. The literature on social economics (Th3) highlights that governments necessarily adopt values, which shape and define the essence of their policies and the capacity of different social institutions at contributing to a sustainable, just, and efficient economy. From the political economy perspective (Th4), we learn the need of a careful consideration of economic, political and social conditions, as well as the importance of the (re)combination of partial interests into a systemic interest underlying industrial policy. From the structural change literature (Th5), we understand that promoting economic development means encouraging the structural dynamics of economies, while governing the interrelated structural changes in the living conditions of people, communities, cities, regions and nations. The human development paradigm

(Th6) emphasises that industrial development and industrial policies are not neutral in terms of direct and indirect social and environmental outcomes, and that the increase of economic effectiveness in view of systemic objectives should be primarily directed to expanding human capabilities and ensuring environmental protection.

Therefore, each stream of literature plays a specific function in our framework, as represented in Figure 1.

[INSERT FIGURE 1 HERE]

Therefore, the convergence of these arguments let emerge the main novelty of our framework, i.e. a new directionality for industrial policy in the post-Covid19 era to contribute to promote social resilience and tackle a variety of societal challenges through an expanded role beyond productivity and growth enhancement, which needs to be discussed in details.

5. Combining technical, functionalist and normative perspectives on industrial policy

The connection among the theoretical pillars described in the previous section paves the way for conceiving industrial policy through an integrated framework composed by:

- a) a *technical* perspective on its role as government intervention on production dynamics to pursue given goals;
- b) a *functionalist* perspective on its role to ensure the sustainability of the structural change of the economy and society;
- c) a *normative* perspective on its role to pursue sustainable human development.

The technical perspective has been the prevalent understanding of industrial policy in the long-lasting academic debate, which has engaged with the effectiveness and efficacy of different tools and the appropriateness of different targets, thus mostly focusing on the technical implementation of industrial policy. However, we argue that the functionalist and the normative perspectives deserve more attention for industrial policy to decisively influence the trajectory of economic and social development of any national (or sub-national) system, as well as to contribute to collective and shared efforts for global development (Oldekop et

al., 2020). In this regard, the integration of the technical, functionalist and normative perspectives is fundamental for a turning point on industrial policy, avoiding a detrimental separation and misalignment between them.

5.1 Functionalist perspective on industrial policy

In order to define industrial policies able to address societal challenges at all levels, stronger attention should be paid to the sustainability of structural changes, avoiding increasing vulnerabilities, fractures and inequalities that may hamper the sustainability of industrial development processes themselves.

In this regard, Di Tommaso et al. (2020a) refer to the notion of ‘sustainable structural change’ as a process of medium- and long-term change in the relative proportions between sectors of the economy, which entails adjustment phases of the economic and social structures,²⁷ without compromising the proper functioning of the system. As in triple bottom line approach to human wellbeing (Sachs, 2012) underlying the 2030 Agenda for Sustainable Development (UN, 2015), the sustainability of structural change should thus be assessed keeping into equal account its three dimensions: the economic, social and environmental. From the economic standpoint, sustainable structural change could therefore be associated with a path of economic growth, whereby productivity gains in one sector release productive resources for the emergence of other sectors. From the social standpoint, sustainable structural change occurs by preserving the integrity of the social system, namely by acknowledging potential vulnerabilities and governing possible fractures and divergence of interests that could make the system inoperative with respect to overall societal and collective goals. From the ecological standpoint, sustainable structural change should generate a scale of production that does not hamper the capacity of ecosystems natural resources to continuously regenerate themselves, avoiding environmental collapses, permanent losses and damages.

To put it briefly, in this functionalist perspective industrial policy should be considered as a powerful tool for governing structural changes in view of systemic objectives, influencing the development trajectory in a way such that economic transformations occur without causing the collapse of the entire socio-economic system potentially due to environmental, social or economic vulnerabilities among a plurality of interconnected dynamics. Successful government intervention on production and industrial dynamics must be able to acknowledge and mitigate the potential (ecological, economic and social) threats to system sustainability that

could characterize the process of structural change. In this view, the main contribution of industrial policy is enhancing the system's overall ability to evolve in the long run and maintaining a well-functioning and dynamic socio-economic system (Peneder, 2017).

5.2 Normative perspective on industrial policy

The relevance of this functionalist perspective has surely been enhanced by the social and economic collapse of several economic systems due to Covid19. Yet, pursuing a sustainable structural change may not be sufficient in the absence of a unifying and underlying vision of the state of the economy and society to be achieved. Indeed, the pandemic has made evident both the importance of expanding human capabilities and enabling their effective realization into achieved functionings, as well as the priority of public health, freedom of movement, social and family relations, decent work, good housing conditions, quality education and clean environment.

Therefore, in a normative perspective, a new set of principles shaping objectives, targets and tools for industrial policy are needed in order to steer the evolution of the economy and the society “towards activities that are desirable in economic terms (improving efficiency), in social terms (addressing needs and reducing inequality), in environmental terms (assuring sustainability and preventing climate change)” (Pianta et al., 2016, p. 6). This recalls the long-lasting debate on the meaning of development in terms of goals and processes (Seers, 1969; Myrdal, 1970; Ingham, 1993) towards which countries strive by means of both public and private strategies and actions.

In our view, the sustainable human development paradigm offers a solid base for this normative perspective on industrial policy, being composed by four pillars on an equal level (Haq, 1995):

- i) Equity, in terms of political, economic, social and cultural opportunities, as well as distribution and cohesion;
- ii) Participation and empowerment, conceived as being an active individual and collective agent of one's own future;
- iii) Sustainability, concerning equal intergenerational opportunities in environmental, social and economic terms;
- iv) Productivity, pursuing an efficient use of local resources within production systems.

In this paradigm, the lives of human beings – that are the agents, beneficiaries and adjudicators of progress – and the sustainability of our societies in terms of *Planet, People, Prosperity, Peace* and *Partnership* (Sachs, 2015; UN, 2015) should be the ultimate concern for any government intervention at all levels (Biggeri and Ferrannini, 2014), aiming at creating “a conducive environment for people, individually and collectively, to develop to their full potential and to have a reasonable chance of leading productive and creative lives that they value” (UNDP, 1990, p.1). Thus, policy interventions should focus on those factors that can lead to improve productivity and value-added enhancing processes while reducing inequalities and addressing the environmental tipping points at the same time (Schwab, 2019).

It follows that prosperity should no longer to be confused with the narrow and exclusive goal of economic growth, nor that economic expansion would automatically deliver benefits for all. Rather, a wider notion of societal (shared) prosperity grounded on a vision of sustainable human development – including, but not restricted to, the economic well-being of people – should be embraced in the design, implementation and evaluation of industrial policy in the post-Covid19 era.

5.3 From systemic to collective interest

The difference – yet also complementarity – between the functionalist and the normative perspective on industrial policy is paralleled by the distinction between systemic and collective interest.

On the former, systemic interest is a property of any system (e.g. regional, national or supranational) in which “interdependencies are such that each interest group has to consider the preservation of the system in order to effectively pursue its own interest” (Cardinale, 2015, p. 203). Indeed, there are multiple ways in which the different and sometimes diverging partial interests of individuals and groups can find an expression compatible with the vital conditions and viability of the system, being able to compromise on suitable weights within the range of configurations compatible with systemic interest (Cardinale and Scazzieri, 2020). Nevertheless, keeping the system viable is a necessary condition for each group’s and stakeholder’s pursuit of its own interest, but it does not (necessarily) reflect a normative commitment to some definition of collective interest (Cardinale, 2018). In other words, the systemic interest may not favour a structural change towards a certain vision of development and it does not (typically) dictate a specific

policy. On the contrary, it specifies a range of proportions: it is a constraint on possible outcomes, and is therefore (in principle) compatible with a plurality of policies (Cardinale, 2018).

On the latter, collective interest should be conceived in terms of a set of societal objective to be pursued after identifying systemic interest and its multiple possible realizations depending on the weights assigned to different partial interests (Cardinale and Scazzieri, 2020). The proper definition of an industrial policy requires considering the existence of multiple societal objectives, that are based on values, i.e. depending on the model of society that each community (either supranational, national or regional) desires to pursue, and are supported by different partial interests within a society (e.g. by territories, sectors, classes, generations, etc.) that need to be recombined in a collectively shared vision.

Therefore, a normative societal vision would express the society's fundamental constitutive values and meaning of development and its systemic interest and, along with influences external to the system – such as a global development paradigm, global flows of resources and ideas, geopolitics relations – that potentially shape it from the outside.

6. Implications for industrial policy governance and implementation

As remarked, government failures can be even more dangerous when industrial policy is conceived in a more comprehensive way (Di Tommaso et al., 2020a). It is therefore important to embed the discussion on industrial policy governance and management within a comprehensive theoretical framework ensuring full understanding of the conditions for the coherence and effectiveness of policy interventions.²⁸

In particular, in this paper our final attention is devoted to industrial policy governance and implementation because: i) they are concerned respectively with creating the conditions for collective action (Olson, 1965; Ostrom, 1990) and making it operational, by extending engagement and commitment to all societal actors; ii) they incorporate an understanding of the multiple loci, layers and levels of action and kinds of variables that can be expected to influence both production dynamics and societal challenges; and iii) their combination makes apparent the link between the 'cognitive act' of formulating what needs to be done and the act of managing its concrete deployment (Hill and Hupe, 2002).

Indeed, in line with Chang and Andreoni (2020, p. 335), the sustainability and inclusiveness of industrial

policy will depend on how the power relationships and conflicts (among social groups, firms, forms of capital, countries) will create and support ‘productive coalitions’ willing to invest in the enhancement of collective productive capabilities to make development processes more sustainable and inclusive, for the sake of both systemic and collective interest.

Therefore, attention should be paid in each context by analysing the specific structural, organisational, institutional and political economy features of production systems (including their functioning and evolution); the interdependencies between industrial sectors and fili res, as a proxy for the interdependencies of interest groups; and how multiple interests, conflicts and powers shape the political economy dynamics leading to multiple possible realizations of systemic interest.²⁹

As highlighted in Figure 2, industrial policy governance and implementation must be at the centre of a policy framework shaped both by a normative societal vision and a new understanding of industrial policy economics, political economy, and management as derived from their respective disciplines, as well as by shocks and changes emerged within and outside each economic and social system.

[INSERT FIGURE 2 HERE]

Therefore, keeping into account the pillars and components of our framework, some implications for industrial policy governance and implementation can be derived.

6.1 Co-determination of societal vision and objectives

The primary implication is the co-determination of a normative societal vision and its related objectives for industrial policy. Indeed, the discussion of societal objectives and the identification of strategic priorities in our economies and societies consistent with such normative vision requires concrete mechanisms for participatory governance and collective appraisal, involving a wide set of actors within our societies. This appears coherent with the modern shift from ‘government’ to ‘governance’ underlying any policy process (Hill and Hupe, 2002) that has overcome simplistic hierarchical models. Furthermore, it embraces the recent understanding of industrial policy as a design process (Rodrik, 2004; Aiginger and Rodrik, 2020), based on an intensive dialogue and coordination between different stakeholders (such as government, industrial and

trade-union interests, social actors), which highlight the respective opportunities and constraints, opening to new solutions, experiments, and collective learning.

Any country (or region) wishing to design industrial policy for sustainable human development must then foresee specific mechanisms devoted to discussing with key actors the societal priority challenges to be addressed and goals to be achieved. Whatever the mechanisms, what is crucial is that different stakeholders are called to contribute to this vision-building process to pull a systemic industrial policy (Aiginger, 2014) and coalition-building approach to ensure a broad mobilization (Rodrik and Sabel, 2019), including the academia, think-tanks, workers' and business' representatives, civil society organizations, and so forth. By managing power struggles and conflicts that may emerge in a participatory formulation of industrial policy vision and objectives, it is possible to limit regulatory capture, as well as information asymmetries, which may seriously hamper government's effectiveness in driving sustainable structural change.

6.2 Institutional arrangements for civic engagement and voicing capacity

As stressed by the political economy of industrial policy, enabling these processes and mechanisms for the discussion of societal objectives and priorities implies investing in civic engagement and voicing capacity by all social and economic groups and stakeholders, representing different interests. Indeed, certain social groups potentially carry interests on industrial policy but do not necessarily organise themselves to influence policy-making processes (Cardinale, 2018). Moreover, certain aggregations (e.g. industries, sectors, territories) may not recognise the strict system of interdependencies that tie them to each other.

Therefore, it is necessary to put in place institutional mechanisms to enable aggregations, social groups and stakeholders organizing themselves in expressing their interests and realizing to be part of a community of actors, whose partial interests should be recomposed to let emerge both a systemic interest – i.e. for the sustainability of the system itself – and a collective interest – i.e. towards a shared normative vision. As long emphasised in the debate, such institutional mechanisms requires achieving a balance between coordination and capture through the principle of 'embedded autonomy' (Evans, 1995), for the government to be autonomous and embedded in societal networks (in particular industry and business networks) in implementing industrial policy in practice, in order to avoid one of the main sources of government failures.

For instance, if institutional structures hinder collective action, if learning processes constrain recursive actor rationality, and if consultative and deliberation mechanisms are not inclusive, thus the systemic capacity to design appropriate industrial policy strategies for societal goals would be significantly hampered (Biggeri and Ferrannini, 2014). Furthermore, this could even lead to conflicting dynamics that result in further horizontal inequalities, polarization of power and social unrest for the reclaim of policy spaces. Rather, investments in expanding public deliberation, institution building and collective learning could lower the magnitude and weight of transaction costs to construct a shared societal vision underlying industrial policy design.

6.3 Policy coherence and multi-level alignment

Policy coherence, multi-level alignment and synergic combination of top-down and bottom-up processes (Hill and Hupe, 2002; Crescenzi and Rodriguez-Pose, 2011; Biggeri and Ferrannini, 2014) should become hallmarks of industrial policy governance and management. Indeed, the interplay of policy interventions from different levels based on multiple resources, institutions and capacities shapes both the industrial performance and production dynamics and their effects on social outcomes. Ensuring that industrial policy across levels are connected, integrated and aligned in the pursuit of coherent objectives and in the provision of public goods is essential to avoid detrimental redundancies and overlaps of responsibilities and to exploit institutional and policy complementarities for an harmonized policy towards sustainable human development. In this regard, first it is important to identify those institutions and departments dealing with industrial policy design and implementation at all levels of government, i.e. in charge of translating the challenges and priorities into specific tools and targets for intervention; second, it is fundamental to invest in the building of a continuous flow of information, as transparent as possible, within the administration and across such departments; third, those involved in the making of industrial policy must have clearly in mind the normative societal vision that industrial policy is trying to achieve, and understand how this is coherently translated into targets and tools, thus limiting self-seeking behaviours by public officials.

6.4 Government capacity and complexity

Industrial policy governance and implementation need capable governments. A turning point in industrial policy must necessarily start from the idea that governments are not destined to fail and that investing in governments' capabilities must go hand in hand with the use of industrial policy. This appears fundamental to make both policy-makers (leading industrial policy governance) and public officials (leading industrial policy management) able to: embrace the complexity affecting the reality of production dynamics and societal challenges; deploy robust and evidence-based processes for the selection of strategic targets and appropriate tools; coordinate efforts and timely react to changing societal conditions and challenges; learn consciously from successes and failures of different interventions and tools. This would require both governments with pre-existing weak or strong capacities to, respectively, setting or adapting the proper governance and implementation structures for industrial policy towards sustainable human development. In this respect the international community can play a role, particularly via international organizations and academic networks that can envisage new roles in promoting exchanges of ideas, governance structures and policy practices, peer-to-peer learning among public officials, and technical assistance initiatives. This would enable multi-directional learning in designing and implementing industrial policy in all countries towards a global paradigm for a more sustainable and equitable world.

6.5 Monitoring and evaluation

New monitoring and evaluation frameworks for industrial policy should be designed and applied in order to recognize errors and revise policies accordingly, enhancing the relation between societal objectives and the effectiveness of interventions, for the sake of transparency and accountability toward the public interest (Rodrik, 2014). In particular, industrial policy outcomes – i.e. the real results, whether intended or unintended, that are actually achieved (Lane and Ersson, 2000) – should be evaluated against sustainable human development indicators.³⁰ Thus, assessing the performances of production and industrial systems at national and subnational level should be based on new definitions of competitiveness, productivity and value-added aligned with concerns for human development, social cohesion and sustainability (Aginger, 2014). Similar efforts for accountability would serve to prevent corruption, favouritism and other forms of

collusive behaviour, and also to legitimize appropriate industrial policies (Rodrik, 2014) pursuing a normative societal vision.

In a nutshell, these preliminary policy implications – though singularly not new in the debate – together remark the need to invest in the accurate and transparent design of industrial policy in the post-Covid19 era. They imply to establish skills, resources, capabilities and structures in public organizations to be effective at planning and learning in partnerships with the private sector and civil society, as well as at deploying and strategically coordinating multiple policy instruments and institutions addressing complex interdependencies (Andreoni and Chang, 2018).

7. Final remarks

In our post-Covid 19 economies and societies, both in developed and developing countries, a turning point on the connection between industrial policy, sustainability and development has been reached.

On the one side, well before this pandemic industrial policy was back on the agenda, starting to being conceived through a systemic approach that extends far beyond the correction of market failures and steered by societal goals for the sake of long-run collective interest. On the other side, the pandemic has surely accelerated this shift in the academic and policy-making spheres on industrial policy, revamping attention on the need for public action and government intervention on production dynamics both to tackle dramatic economic and social problems in the short run and to steer the structural transformation of the economy and the society in the medium and long run.

Nevertheless, human development, social cohesion and sustainability do not seem to have been placed at the very centre of industrial policy yet, whose urgency is apparent in the post-Covid19 era. Therefore, we argue it is time for a decisive turning point to fully reflect an integrated notion of sustainable human development (i.e. combining environmental concerns and awareness on planetary limits to growth with both people's inclusiveness, equality of opportunities and wellbeing, and with shared and long-term societal prosperity), both in the academic debate and in the real- world practices of industrial policy.

Such turning point urges us to rethinking both the theoretical foundations, as well as governance and implementation processes of industrial policy.

In this paper, we have argued that industrial policy should be conceived both as a technical and political intervention to re-design our future societies, favouring and governing a structural transformation of the industry, the economy and the whole society. This implies primarily that industrial policy must be fundamentally tied to a value-based societal vision able to reconcile sustainability and development. Consequently, it implies a new understanding of the multiple inter-linkages and feedbacks among industrial policy economics, political economy and management, shaping its governance mechanisms and implementation processes.

Our analytical framework opens up a partially unexplored line of research, which requires a mutual engagement between theory and practice of industrial policy, keeping them tied to each other according to real-world conditions. Future research on industrial policy, sustainability and development would be required to explore the connection between societal goals, strategic targets and effective tools; conduct comparative analysis of industrial policy for sustainable human development in a long run perspective; analyse multi-level governance mechanisms and policy coherence; dig deeper into policy-making mechanisms and institutional settings favouring the identification of a normative societal vision and a collective interest on societal objectives, as well as conflict management, transparency and accountability; assess the effect of different industrial policy tools on wider societal goals and challenges.

In order to implement this turning point on industrial policy for sustainable human development, it is responsibility of scholars actively supporting – and engaging with – policy-makers in setting industrial policies based on comprehensive, multi-level analytical principles, and carried out through robust and transparent decision-making processes. This represents an element of highest concern in a world looking (and needing) for new theoretical bases to design and implement appropriate multilevel responses in the post-Covid19 era at all levels.

Endnotes

¹ Since the early seminal contributions (WCED, 1987; Tisdell, 1988; Lélé, 1991; Beckerman, 1992; Anand and Sen, 2000), the debate on sustainability and development has gained momentum, having been decisively enhanced by the adoption of the Agenda 2030 for Sustainable Development (UN, 2015) along with the role played by several academic journals and societies.

² Moreover, this was unjustified both in terms of history of economic ideas – e.g. the concept of ‘invisible hand’ is only once mentioned by Adam Smith (Reinert, 2020 among others) – and in terms of modern economic theory (e.g. Arrow and Hahn, 1971).

³ See, for instance, Hall and Hamont (2013); Keck and Sakdapolrak (2013).

⁴ Such trickle-down approach also almost entirely disregarded the effect working through the network of interdependencies built on the interdependent production processes and the intertwined supply chains for goods and services (Leontief, 1941; Pasinetti, 1977).

⁵ See Aiginger and Rodrik (2020) for a careful review of definitions of industrial policy; Reinert (2020) for overview of the historical arguments that have been used to argue for industrial policy in its widest sense; Andreoni and Chang (2018) for the history of economic analysis of industrial policy.

⁶ For instance, the dichotomy distinguishing between vertical policies, which are geared towards supporting specific sectors, and horizontal policies, which are non-discriminatory and aim to promote an enabling and competitive environment for business growth (Bailey and Tomlinson, 2017), has blurred and it is now acknowledged that horizontal policies must be adjusted to the particular context of an industry and they affect sectors differently, leading towards a more integrated perspective (Peneder, 2017).

⁷ See, for instance, Di Tommaso and Schweitzer (2013); Andreoni and Chang (2016); Aiginger and Rodrik (2020).

⁸ Be it either of markets (Bator, 1958), systems (Smith, 2000) or strategic (Cowling and Tomlinson, 2011) for the supporters of industrial policy, or governments for its opponents (Tullock, 1967; Krueger, 1974).

⁹ It represents the new universal global Agenda, composed by 17 Sustainable Development Goals (SDGs) and 169 targets adopted by the United Nations in 2015 (UN, 2015). As for the production dynamics and industrial policy, the Agenda 2030 dedicates specific attention to: SDG#8 “sustained, inclusive and

sustainable economic growth”, especially through full and productive employment and decent work for all; SDG#9 “sustainable industrialization”, conceived as the primary driver in fighting poverty and preventing social polarization, especially through the integration of small-scale industrial and other enterprises into value chains and markets.

¹⁰ Analyses of the industrial policy practices in these three cases become crucial due not only to their undeniable centrality in global production networks, in financial and investment flows, in research and innovation processes and in consumption patterns, but also to their weight and influence in the international policy debate on government intervention and industrial policy. Back in the past as well as in the recent present, their policy experience has often been taken (and in some cases imposed) as a model for developing countries, as in the case of the Washington Consensus (Gore, 2000; Saad-Filho, 2007), the post-Washington Consensus (Fine et al., 2011) or the most recent Beijing Consensus (Bird et al. 2012). Other groups of countries surely have relevant experiences of industrial policy and government intervention governing structural change, shaped by the variety of their capitalisms, government systems and investment capacities (Amsden, 2001). For instance: East-Asia countries, such as Japan and South Korea, to gain and keep global leadership in advanced manufacturing sectors; emerging countries, such as Brazil, India and South Africa, to avoid the ‘middle-income trap’; countries characterised by high availability of oil production and/or sovereign wealth funds, such as Saudi Arabia, Russia and United Arab States, for economic diversification; African economies, such as Ethiopia, Botswana and Ghana, to get out of poverty.

¹¹ See, for instance, Biggeri (2008), Rodrik (2010), Di Tommaso et al. (2013, 2020b), Ratigan (2017), Cai and Sun (2018), Barbieri et al. (2019a, 2019b, 2020), Biggeri and Bortolotti (2020).

¹² For instance, impressive industrial GDP growth in China has been accompanied by environmental degradation, workers’ exploitation, and unbalanced development among Chinese provinces (Biggeri, 2008), requiring policy changes and new strategic targets (Barbieri et al., 2020; Biggeri and Bortolotti, 2020).

¹³ See, for instance, Block (2008), Di Tommaso and Schweitzer (2013); Mazzucato (2013), Di Tommaso et al. (2020c); Tassinari (2019).

¹⁴ See, for instance, Aiginger (2014); Mosconi (2015); Pianta (2014); Pianta et al. (2016); Eder and Schneider (2018).

¹⁵ Talking about industrial policy in the EU is complicated due to the undeniable importance of competition policy within the single market, the interplay of responsibilities and competences between the supranational, national and regional levels, and the multiplicity of strategies, programmes, frameworks and regulations that are discussed, announced and – to a different extent according to conditions in each member state – implemented and made operational (Landesmann and Stöllinger, 2020).

¹⁶ Among others, organizations like OECD, IMF and IGC are tracking the key policy responses to Covid19 in different areas of the world.

¹⁷ According to Di Tommaso et al. (2020a), ‘targeting’ has most focused on those more dynamic industries that show the best chances to compete in international markets and reach systematically a new large-scale demand for consumption. Nevertheless, the uncertainty connected to the future competitiveness and economic performance of different targets remains one of the most critical issues in defining an industrial policy (Lin and Chang, 2009).

¹⁸ According to Schot and Steinmueller (2018), the consolidation of this third framing does not imply lessening the importance of – or even abandoning – the previous policy practices, as investment in knowledge infrastructure and R&D continues to be fundamental, as well as strengthening interactions and learning process among all societal actors within national, sectoral, regional and transnational systems of innovation.

¹⁹ See, for instance, Pressman (2006); Dannreuther and Kessler (2008); Davis and Dolfsma (2008); Elsner (2014).

²⁰ See, for instance, Robbins (1981); Dahrendorf (1988); Chang (1994).

²¹ This resembles also Reinert’s (2006) theoretical insights on wealth as a product of systemic factors, an argument early established in the industrial policy debate as in List’s (1841) ‘national system of political economy’.

²² According to Cardinale and Scazzieri (2018), classical political economy explains structural change in terms of proportionality conditions determining the way existing structures adjust to temporary or persistent sources of change. In particular, the classical approach to medium-term dynamics sees structural change as a sequence of transformation stages leading the economy from one position to another along a trajectory driven by some initial disturbance. In contrast, the classical approach to long-term dynamics views structural

change as a trajectory in which economic structure is modified because of a persistent change of fundamental parameters.

²³ See, for instance, Baranzini and Scazzieri (1990); Deutsch and Syrquin (1989); Kutnetz (1971); North (1990); Syrquin (1988, 2008).

²⁴ See, for instance, UNDP (1990); Sen (1992, 1999, 2009); Nussbaum (2000, 2011); Drèze and Sen (2002); Mehrotra and Biggeri (2007); Biggeri and Ferrannini (2014); Capriati (2017).

²⁵ See, for instance, Evans (2002); Stewart (2005); Ibrahim (2006); Deneulin and McGregor (2010); Biggeri and Ferrannini (2014); D'Amato (2020).

²⁶ On these concerns, the debate among the capability scholars is very animated. For instance, according to Robeyns (2016), all capability theories should be normatively individualistic (thus having the advantage of each and every affected individual as ultimate concern), while D'Amato (2020) relegates ethical individualism to optional status and proposes collectivist capability theories to allow capability theorizing in explicitly non-liberal socio-political contexts.

²⁷ See, for instance, Landesmann and Scazzieri (1990, 1996); Scazzieri (2018); Bianchi and Labory (2019a, 2019b).

²⁸ Here, we draw from implementation theory (Pressman and Wildavsky, 1984; Hill and Hupe, 2002) to complement our discussion and move towards implications for public management of industrial policy.

²⁹ This contributes overcoming also the limited integration of economics and politics within the developmental state literature, which made it remarkably and paradoxically static as a portfolio of economic policies or as a political structure (Fine, 2007).

³⁰ See Biggeri et al. (2019) and Biggeri and Ferrannini (2020) for a review of sustainable development indicators and datasets.

References

- Acemoglu, D. (2020). *Unknowns, Challenges and Opportunities in the Time of Covid-19*. Seminar at MIT - Massachusetts Institute of Technology, 9 April 2020, available at <https://economics.mit.edu/files/19370> (Last accessed, 29 May 2020).
- Aghion, P., Boulanger, J. & Cohen, E. (2011). Rethinking industrial policy. *Bruegel Policy Brief*, Issue 2011/04.
- Aiginger, K. (2007). Industrial Policy: A Dying Breed or A Re-emerging Phoenix. *Journal of Industry, Competition and Trade*, 7, 297-323.
- Aiginger, K. (2013). The "Greening" of Industrial Policy, Headwinds and a Possible Symbiosis. *WIFO Working Papers*, 450/2013.
- Ainger, K. (2014). *Industrial Policy for a sustainable growth path*. Policy Paper no. 13, WWW For Europe,
- Aiginger, K., & Rodrik, D. (2020). Rebirth of Industrial Policy and an Agenda for the Twenty-First Century. *Journal of Industry, Competition and Trade*, 20, 189-207.
- Altenburg, T., & Assmann, C. (Eds.) (2017). *Green Industrial Policy. Concept, Policies, Country Experiences*. Geneva, Bonn: UN Environment; German Development Institute / Deutsches Institut für Entwicklungspolitik (DIE).
- Amsden, A. (2001). *The Rise of "The Rest": Challenges to the West from Late-Industrializing Economies*. Oxford: Oxford University Press.
- Anand, P. Ferrer, B., Gao, Q., Nogales, R. & Unterhalter, E. (2020). COVID-19 as a Capability Crisis: Using the Capability Framework to Understand Policy Challenges. *Journal of Human Development and Capabilities*, 21, 3, 293-299.
- Anand, S., & Sen, A.K. (2000). Human development and economic sustainability. *World Development*, 28, 2029-2049.
- Andreoni, A., & Chang, H.-J. (2016). Industrial policy and the future of manufacturing. *Economia e Politica Industriale*, 43, 491-502.

- Andreoni, A., & Chang, H.-J. (2018). The political economy of industrial policy: Structural interdependencies, policy alignment and conflict management. *Structural Change and Economic Dynamics*, 48, 136-150.
- Andreoni, A., Chang, H.-J., & Scazzieri, R. (2019). Industrial Policy in Context: Building Blocks for an Integrated and Comparative Political Economy Agenda. *Structural Change and Economic Dynamics*, 48, 1-6.
- Aoki, M. (2002). *Toward a Comparative Institutional Analysis*. Cambridge, MA: MIT Press.
- Arrow, K.J. (1962). Economic welfare and the allocation of resources for invention. In R. Nelson (Ed.). *The Rate and Direction of Inventive Activity*. Princeton: National Bureau of Economic Research and Princeton University Press, 609-625.
- Arrow, K. & Hahn, F.H. (1971). *General Competitive Analysis*. North Holland.
- Bailey, D., & Tomlinson, P. (2017). Back to the Future? UK Industrial Policy After the Great Financial Crisis. In P. Arestis & M. Sawyer (Eds.). *Economic Policies since the Global Financial Crisis*, International Papers in Political Economy, Palgrave Macmillan.
- Bailey, D., Cowling, K., & Tomlinson, P. (Eds.) (2015). *New Perspectives on Industrial Policy*. Oxford: Oxford University Press
- Bailey, D., Glasmeier, A., Tomlinson, P.R., & Tyler, P. (2019a). Industrial policy: new technologies and transformative innovation policies?. *Cambridge Journal of Regions, Economy and Society*, 12(2), 169-177.
- Bailey, D., Coffey, D., Gavis, M. & Thornley, C. (2019b). Industrial policy, place and democracy. *Cambridge Journal of Regions, Economy and Society*, 12, 327-345.
- Baranzini, M., Scazzieri, R. (Eds.) (1990). *The Economic Theory of Structure and Change*. Cambridge: Cambridge University Press.
- Barbieri E., Di Tommaso M.R., Tassinari M., & Marozzi M. (2019a). Selective Industrial Policies in China: Investigating the Choice of Pillar Industries. *International Journal of Emerging Markets*, <https://doi.org/10.1108/IJOEM-02-2018-0105>

- Barbieri, E., Di Tommaso, M.R., Pollio, C., & Rubini, L. (2019b). Industrial Policy in China: The Planned Growth of Specialised Towns in Guangdong Province. *Cambridge Journal of Regions, Economy and Society*, 12(3), 401–422.
- Barbieri E., Di Tommaso, M.R., Pollio, C., & Rubini, L. (2020). Getting the specialization right. Industrialization in Southern China in a sustainable development perspective. *World Development*, 126, 104701.
- Bator, F.M. (1958). The anatomy of market failure. *Quarterly Journal of Economics*, 72(3), 351–379.
- Beckerman, W. (1992). Economic growth and the environment: Whose growth? Whose environment?. *World Development*, 20(4), 481-496.
- Bianchi, P., & Labory, S. (Eds.). (2006). *International Handbook on Industrial Policy*. Cheltenham: Edward Elgar Publishing.
- Bianchi, P., & Labory, S. (2011). *Industrial Policies after the Crisis. Seizing the Future*. Cheltenham, Edward Elgar Publishing.
- Bianchi, P., & Labory, S. (2019a). *Industrial Policy for the Manufacturing Revolution: Perspectives on Digital Globalisation*. Cheltenham: Edward Elgar Publishing.
- Bianchi, P. & Labory, S. (2019b). Manufacturing regimes and transitional paths: Lessons for industrial policy. *Structural Change and Economic Dynamics*, 48, 24-31.
- Biggeri, M. (2008). China in Perspective. From economic “miracle” to human development?. In A. Deshpande (Ed). *Globalization and Development. A Handbook of New Perspectives*, Oxford: Oxford University Press, 232-256.
- Biggeri, M. (2020). Small and medium enterprises and industrial clusters in BRICS countries. In P.B. Anand, S. Fennell & F. Comim (Eds.). *Handbook of BRICS and Emerging Economies*. Oxford: Oxford University Press, forthcoming.
- Biggeri, M., & Bortolotti, L. (2020). Towards a ‘harmonious society’? Multidimensional development and the convergence of Chinese provinces. *Regional Studies*, DOI: 10.1080/00343404.2020.1746759.

- Biggeri, M., & Ferrannini, A. (2014). *Sustainable Human Development: A New Territorial and People-centred Perspective*. Basingstoke and New York: Palgrave Macmillan.
- Biggeri, M., & Ferrannini, A. (2020). *Framing R&I for transformative change towards sustainable development in the European Union*. Independent experts' report for the European Commission, DG Research and Innovation.
- Biggeri, M., Clark, D.A., Ferrannini, A. & Mauro, V. (2019). Tracking the SDGs in an “integrated” manner: A proposal for a new index to capture synergies and trade-offs between and within goals. *World Development*, 122, 628-647.
- Bird, G., Mandilaras, A., & Popper, H. (2012). Is there a Beijing Consensus on International Macroeconomic Policy?. *World Development*, 40 (10), 1933-1943.
- Block, F. (2008). Swimming against the current: The Rise of a Hidden Developmental State in the United States. *Politics & Society*, 36(2), 69-206.
- Cai, M. & Sun, X. (2018). Institutional bindingness, power structure, and land expropriation in China. *World Development*, 109, 172-186.
- Capriati, M. (2017). *Capabilities, Innovation and Economic Growth. Policymaking for Freedom and Efficiency*. London: Routledge.
- Cardinale, I. (2015). Towards a structural political economy of resources. In M. Baranzini, C. Rotondi & R. Scazzieri (Eds.). *Resources, Production and Structural Dynamics*, Cambridge: Cambridge University Press, 198-210.
- Cardinale, I. (2018). Structural Political Economy. In I. Cardinale & R. Scazzieri (Eds.). *The Palgrave Handbook of Political Economy*. London: Palgrave Macmillan, 769–784.
- Cardinale I., & Scazzieri R. (2018). Explaining structural change: actions and transformations. *Structural Change and Economic Dynamics*, 51, 393-404.
- Cardinale, I., & Scazzieri, R. (2020). Interdipendenze produttive, interessi e condizioni sistemiche: Elementi per un'economia politica delle strutture industriali. *l'industria - Rivista di Economia e Politica Industriale*, 1/2020, forthcoming.

- Chang, H.-J. (1994). *The Political Economy of Industrial Policy*. New York: St. Martin's Press
- Chang, H.-J. (Ed.) (2003). *Rethinking Development Economics*. London and New York: Anthem Press.
- Chang, H.-J. & Andreoni, A. (2020). Industrial Policy in the 21st Century. *Development and Change*, 51(2), 324-351.
- Cimoli, M., Dosi, G., & Stiglitz, J.E. (Eds.) (2009). *Industrial Policy and Development. The Political Economy of Capabilities Accumulation*. Oxford: Oxford University Press.
- Cowling, K., & Tomlinson, P.R. (2011). Post the 'Washington consensus': economic governance and industrial strategy for the twenty-first century. *Cambridge Journal of Economics*, 35, 831-852.
- Crescenzi, R., & Rodríguez-Pose, A. (2011). Reconciling top-down and bottom-up development policies. *Environment and Planning A*, 43(4), 773-780.
- D'Amato, C. (2020). Collectivist Capabiltarianism. *Journal of Human Development and Capabilities*, 21(2), 105-120.
- Dahrendorf, R. (1988). *The Modern Social Conflict. An Essay on the Politics of Liberty*. New York: Weiden & Nicolson.
- Dannreuther, C., & Kessler, O. (2008). The states of social economics. In J.B. Davis & W. Dolfsma (Eds.). *The Elgar Companion to Social Economics*. Cheltenham: Edward Elgar Publishing, 537-554.
- Davis, J.B., & Dolfsma, W. (Eds.) (2008). *The Elgar Companion to Social Economics*. Cheltenham: Edward Elgar Publishing.
- Deneulin, S. & McGregor, J.A. (2010). The capability approach and the politics of a social conception of wellbeing. *European Journal of Social Theory*, 13(4), 501-519.
- Deutsch, J., & Syrquin, M. (1989). Economic development and the structure of production. *Economic Systems Research*, 1, 447-464.
- Di Tommaso, M.R., & Schweitzer, S.O. (2013). *Industrial Policy in America. Breaking the Taboo*. Cheltenham: Edward Elgar Publishing.

- Di Tommaso M.R., Rubini L., & Barbieri E. (2013). *Southern China: Industry, Development and Industrial Policy*. London and New York: Routledge.
- Di Tommaso, M.R., Tassinari, M., Barbieri, E., & Marozzi, M. (2020a). Selective industrial policy and ‘sustainable’ structural change. Discussing the political economy of sectoral priorities in the US. *Structural Change and Economic Dynamics*, 54, 309-323.
- Di Tommaso, M.R., Spigarelli, F., Barbieri, E., & Rubini, L. (2020b). *The Globalization of China’s Health Industry: Industrial Policies. International Networks and Company Choices*. London: Palgrave Macmillan.
- Di Tommaso, M.R., Tassinari, M., & Ferrannini, A. (2020c). Industrial policy and societal goals. A new look at the American case (from Hamilton to Obama and Trump). In S. Pressman (Ed.), *How Social Forces Impact the Economy*, Routledge.
- Drèze, J., & Sen, A.K. (2002). *India, development and participation*. New Delhi: New Delhi University Press.
- EC (2010a). EUROPE 2020. *A strategy for smart, sustainable and inclusive growth*. Brussels, 3.3.2010 COM(2010) 2020
- EC (2010b). *An Integrated Industrial Policy for the Globalisation Era Putting Competitiveness and Sustainability at Centre Stage*. Brussels, 28.10.2010 COM(2010) 614 final
- EC (2010c). *Regional Policy contributing to smart growth in Europe 2020*. Brussels, 6.10.2010 COM(2010) 553 final
- EC (2019). *The European Green Deal*. Brussels, 11.12.2019 COM(2019) 640 final.
- EC (2020). *Europe’s moment: Repair and Prepare for the Next Generation*. Brussels, 27.5.2020 COM(2020) 456 final.
- Eder, J., & Schneider, E. (2018). Progressive Industrial Policy – A Remedy for Europe!?. *Journal für Entwicklungspolitik*, 34(3/4), 108-142.
- Elsner, W. (2014). Social Economics and Evolutionary Institutionalism Today. *Forum for Social Economics*, 46(1), 52-77.

- Etzkowitz, H. (2008). *The Triple Helix: University-Industry-Government Innovation in Action*. New York: Routledge.
- Evans, P. (1995). *Embedded Autonomy. States and Industrial Transformation*. Princeton: Princeton University Press.
- Evans, P. (2002). Collective capabilities, culture, and Amartya Sen's development as freedom. *Studies in Comparative International Development*, 37(2) 54-60.
- Fine, B. (2007). State, development and inequality: the curious incident of the developmental state in the night-time. *Paper presented at the Sanpad Conference, Durban, 26-30 June 2007*.
- Fine, B. Lapavistas, C., & Pincus, J. (Eds.) (2011). *Development Policy in the Twenty-First Century: Beyond the Post-Washington Consensus*. London and New York: Routledge.
- Fleurbaey, M. (2020). *We are all in this together ? More than you think*. UN DESA 6 April 2020, available at <https://www.un.org/development/desa/dpad/wp-content/uploads/sites/45/Fleurbaey.pdf> (Last accessed, 29 May 2020).
- Freeman, C. (1987). *Technology and Economic Performance: Lessons From Japan*. London: Pinter.
- Fukuda-Parr, S. (2007). *Rethinking the policy objectives of development aid: From economic growth to conflict prevention*. UNU-WIDER Research Paper, no 2007/32.
- Guterres, A. (2020). *We are all in this Together: Human Rights and COVID-19 Response and Recovery*. Message by the United Nations Secretary-General, 23 April 2020, available at <https://www.un.org/sg/en/content/sg/statement/2020-04-23/we-are-all-together-human-rights-and-covid-19-response-and-recovery-video-message-the-secretary-general-delivered> (Last accessed, 29 May 2020).
- Hall, P.A. & Lamont, M. (Eds.) (2013). *Social resilience in the neoliberal era*. Cambridge University Press.
- Haq, M. (1995). *Reflections on human development*. Oxford: Oxford University Press.
- Harvey, D. (2020). *Anti-Capitalist Politics in the Time of COVID-19*. Jacobin Magazine, 20 March 2020, available at <https://jacobinmag.com/2020/03/david-harvey-coronavirus-political-economy-disruptions> (Last accessed, 29 May 2020).

- Hepburn, C., O'Callaghan, B., Stern, N., Stiglitz, J.E., & Zenghelis, D. (2020). *Will COVID-19 fiscal recovery packages accelerate or retard progress on climate change?*. Oxford Smith School of Enterprise and the Environment, Working Paper No. 20 02.
- Hickey, S. (2005). The Politics of Staying Poor: Exploring the Political Space for Poverty Reduction in Uganda. *World Development*, 33(6), 995-1009.
- Hill, M. & Hupe, P. (2002). *Implementing Public Policy*. London: Thousand Oaks and New Delhi: Sage Publications.
- Kalecki, M. (1976). *Essays on Developing Economies*. Atlantic Highlands: Humanities Press.
- Keck, M. & Sakdapolrak, P. (2013). What is social resilience? Lessons learned and ways forward. *Erdkunde*, 67(1), 5-19.
- Khan, M.H. (2017). Political settlements and the analysis of institutions. *African Affairs*, 117(469), 636-655.
- Ibrahim, S. (2006). From individual to collective capabilities: The capability approach as a conceptual framework for self-help. *Journal of Human Development*, 7(3), 397-416.
- IMF (2020a). *World Economic Outlook – Chapter 1: The Great Lockdown*. International Monetary Fund, April 2020.
- IMF (2020b). *World Economic Outlook Update. A Crisis Like No Other, An Uncertain Recovery*. International Monetary Fund, June 2020.
- Ingham, B. (1993). The Meaning of Development: Interaction Between 'New' and 'Old' Ideas. *World Development*, 21(11), 1803-1821.
- Krueger, A.O. (1974). The political economy of the rent-seeking society. *American Economic Review*, 64(3), 291–303.
- Kuznets, S. (1971). *Economic Growth of Nations: Total Output and Production Structure*. Cambridge, MA: Belknap Press of Harvard University Press.
- Landesmann, M. (2018). Political Economy of Structural Change. In I. Cardinale & R. Scazzieri (Eds). *The Palgrave Handbook of Political Economy*. London: Palgrave Macmillan, 705-748.

- Landesmann, M., & Scazzieri, R. (1990). Specification of structure and economic dynamics. In M. Baranzini, & R. Scazzieri (Eds.). *The Economic Theory of Structure and Change*. Cambridge: Cambridge University Press, 95–121.
- Landesmann, M. & Scazzieri, R. (1996). The production process: description and analysis. In M. Landesmann & R. Scazzieri (Eds.). *Production and Economic Dynamics*. Cambridge: Cambridge University Press, 191–228.
- Landesmann, M. & Scazzieri, R. (2012a). The Production Process: Description and Analysis. In M. Landesmann & R. Scazzieri (Eds.). *Production and Economic Dynamics*. Cambridge: Cambridge University Press, 191-228.
- Landesmann, M. & Scazzieri, R. (2012b). Coordination of Production Processes, Subsystem Dynamics and Structural Change. In M. Landesmann & R. Scazzieri (Eds.), *Production and Economic Dynamics*. Cambridge: Cambridge University Press, 304-343.
- Landesmann, M. and Stöllinger, R. (2020). The European Union's Industrial Policy: What are the Main Challenges?. *The Vienna Institute for International Economic Studies - Policy Notes and Reports*, 36.
- Lane, J.E. & Ersson, S.O. (2000). *The New Institutional Politics: Performance and Outcomes*. London: Routledge.
- Lélé, S.M. (1991). Sustainable development: A critical review. *World Development*, 19(6), 607–621.
- Leontief, W. (1941). *The Structure of the American Economy*. New York: Oxford University Press.
- Lin, J.Y. (Ed.) (2012). *New Structural Economics. A Framework for Rethinking Development and Policy*. Washington: The World Bank
- Lin, J.Y. (2017). Industrial policies for avoiding the middle-income trap: a new structural economics perspective. *Journal of Chinese Economic and Business Studies*, 15(1), 5-18.
- Lin, J.Y. & Chang, H.-J. (2009). Should industrial policy in developing countries conform to comparative advantage or defy it? A debate between Justin Lin and Ha-Joon Chang. *Development Policy Review*, 27(5), 483-458.
- List, F. (1841). *Das Nationale System der Politischen Ökonomie*. Stuttgart: Cotta.

- Lundvall, B.-A. (Ed.) (1992). *National Systems of Innovation: Towards a Theory of Innovation and Interactive Learning*. London: Pinter.
- Mathews, J.A. (2020). Greening Industrial Policy. In A. Oqubay, C. Cramer, H.-J. Chang & E. R. Kozul-Wright (Eds.). *The Oxford Handbook of Industrial Policy* Oxford: Oxford University Press, forthcoming.
- Mazzucato, M. (2013). *The Entrepreneurial State. Debunking Public vs. Private Sector Myths*. London and New York: Anthem Press.
- Mazzucato, M. (2016). From market fixing to market-creating: a new framework for innovation policy. *Industry and Innovation*, 23 (2), 140-156.
- Mazzucato, M. (2018). Mission-oriented innovation policies: challenges and opportunities. *Industrial and Corporate Change*, 27(5), 803–815.
- Mazzucato, M. (2020). *The Covid-19 crisis is a chance to do capitalism differently*. The Guardian, 18 March 2020, available at <https://www.theguardian.com/commentisfree/2020/mar/18/the-covid-19-crisis-is-a-chance-to-do-capitalism-differently> (Last accessed, 29 May 2020).
- Mazzucato, M., Cimoli, M., Dosi, G. Landesmann, M.A., Page, T., Pianta, M., Stiglitz, J.E., Walz, R. (2015). Which Industrial Policy Does Europe Need?. *Intereconomics*, 50, 120-155.
- Mazzucato, M., Kattel, R. & Ryan-Collins, J. (2019). Challenge-Driven Innovation Policy: Towards a New Policy Toolkit. *Journal of Industry, Competition and Trade*, 20, 421-437.
- Mehrotra, S., & Biggeri, M. (2005). Can industrial outwork enhance homeworkers' capabilities? Evidence from clusters in South Asia. *World Development*, 33(10), 1735-1757.
- Mehrotra, S., & Biggeri, M. (Eds.) (2007). *Asian informal workers: Global risks local protection*. London and New Delhi: Routledge.
- Mosconi F. (2015). *The New European Industrial Policy. Global competitiveness and the manufacturing renaissance*, London: Routledge.
- Myrdal, G. (1970). *The Challenge of World Poverty*. New York: Pantheon.
- Nelson, R.R. (1959). The simple economics of basic scientific research. *Journal of Political Economy*, 67(3), 297-306.

- North, D.C. (1990). *Institutions, institutional change and economic performance*. Cambridge: Cambridge University Press.
- Nussbaum, M. (2000). *Women and human development*. Cambridge: Cambridge University Press.
- Nussbaum, M. (2011). *Creating capabilities: The human development approach*, Harvard: Harvard University Press.
- Ocampo, J.A. (2020). Industrial Policy, Macroeconomics and Structural Change. *CDEP- CGEG Working Paper Series*, no. 81.
- OECD (2020a). *COVID-19: Protecting people and societies, Tackling coronavirus (Covid19) – Contributing to a global effort*. Paris: Organisation for Economic Co-operation and Development, April 2020.
- OECD (2020b). *OECD Economic Outlook*. Paris: Organisation for Economic Co-operation and Development, June 2020.
- OECD (2020c). *Covid-19 and International Trade: Issues and Actions*. Paris: Organisation for Economic Co-operation and Development, June 2020.
- Oldekop et al. (2020). COVID-19 and the case for global development. *World Development*, 134, 105044.
- Olson, M. (1965). *The Logic of Collective Action. Public Goods and the Theory of Groups*. Cambridge, MA: Harvard University Press.
- Oqubay, A., Cramer, C., Chang, H.-J., & Kozul-Wright, R. (2020). *The Oxford Handbook of Industrial Policy*. Oxford: Oxford University Press, forthcoming.
- Ostrom, E. (1990). *Governing the commons: The evolution of institutions for collective action*. New York: Cambridge University Press.
- Pasinetti, L.L. (1977). *Lectures on the Theory of Joint Production*. London: Macmillan; New York: Columbia University Press.
- Pasinetti, L.L. (2007). *Keynes and the Cambridge Keynesians: A 'Revolution in Economics' to Be Accomplished*. Cambridge: Cambridge University Press.

- Peneder, M., (2017). Competitiveness and industrial policy: from rationalities of failure towards the ability to evolve. *Cambridge Journal of Economics*, 41, 829–858.
- Pianta, M. (2014). An industrial policy for Europe. *Seoul Journal of Economics*, 27, 3.
- Pianta, M., Lucchese, M., & Nascia, L. (2016). What is to be produced? The making of a new industrial policy in Europe. In Rosa-Luxemburg-Stiftung (Eds.), *Progressive industrial policy for the EU? Outmanoeuvring neoliberalism*, Brussels: Rosa-Luxemburg-Stiftung.
- Pietrobelli, C. and Rabellotti, R. (2011). Global Value Chains Meet Innovation Systems: Are There Learning Opportunities for Developing Countries?. *World Development*, 39(7), 1261-1269.
- Piketty, T. (2020). *L'urgence absolue est de prendre la mesure de la crise en cours et de tout faire pour éviter le pire*. Le Monde, 10/4/2020, https://www.lemonde.fr/idees/article/2020/04/10/thomas-piketty-l-urgence-absolue-est-de-prendre-la-mesure-de-la-crise-en-cours-et-de-tout-faire-pour-eviter-le-pire_6036282_3232.html (Last accessed, 29 May 2020).
- Pipkin, S., & Fuentes, A. (2017). Spurred to Upgrade: A Review of Triggers and Consequences of Industrial Upgrading in the Global Value Chain Literature. *World Development*, 98, 536-554.
- Pressman, S. (Ed.) (2006). *Alternative Theories of the State*. Basingstoke: Palgrave Macmillan.
- Pressman, J.L., & Wildavsky, A. (1984). *Implementation* (3rd edn). Berkeley: University of California Press.
- Purvis, B., Mao, Y. & Robinson, D. (2019). Three pillars of sustainability: in search of conceptual origins. *Sustainability Science*, 14, 681-695.
- Quadrio Curzio, A., & Pellizzari, F. (2018). Political economy of resources, technologies, and rent. In I. Cardinale & R. Scazzieri (Eds.). *The Palgrave Handbook of Political Economy*. London: Palgrave Macmillan, 657-704.
- Ratigan, K. (2017). Disaggregating the Developing Welfare State: Provincial Social Policy Regimes in China. *World Development*, 98, 467-484.
- Reinert, E.S. (2006). Evolutionary Economics, Classical Development Economics, and the History of Economic Policy: A Plea for Theorizing by Inclusion. *Working Papers in Technology Governance*

- and Economic Dynamics*, no. 1, The Other Canon Foundation, Norway and Tallinn University of Technology, Tallinn.
- Reinert, E.S. (2020). Industrial policy: A long-term perspective and overview of theoretical arguments. *Working Paper WP 2020-04*, UCL Institute for Innovation and Public Purpose.
- Reinert, S.A. (2018). Historical Political Economy. In I. Cardinale & R. Scazzieri (Eds.). *The Palgrave Handbook of Political Economy*. London: Palgrave Macmillan, 133-170.
- Robbins, L. (1981). Economics and Political Economy. *The American Economic Review*, 71(2), 1-10.
- Rodrik, D. (2004). Industrial policy for the twenty-first century. *CEPR Discussion Paper*, no 4767..
- Rodrik, D. (2010). Diagnostics before prescription, *Journal of Economic Perspectives*, 24(3), 33-44.
- Rodrik D (2014). Green industrial policy. *Oxford Review of Economic Policy*, 30(3), 469-491.
- Rodrik, D. & Sabel, Ch.F. (2019). Building a good jobs economy. *Harvard Kennedy School Faculty Research Working Paper*, No. RWP20-001.
- Saad-Filho, A. (2007). Life beyond the Washington Consensus: An Introduction to Pro-poor Macroeconomic Policies. *Review of Political Economy*, 19(4), 513-537.
- Sachs, J. D. (2012). From Millennium Development Goals to Sustainable Development Goals. *The Lancet*, 379, 2206–2211.
- Sachs, J. (2015). *The age of sustainable development*. New York: Columbia University Press.
- Scazzieri, R. (2018). Structural dynamics and evolutionary change. *Structural Change and Economic Dynamics*, 46, 52–58.
- Schot, J., & Steinmueller, W.E. (2018). Three frames for innovation policy: R&D, systems of innovation and transformative change. *Research Policy*, 47, 1554-1567.
- Schwab, K. (Ed.) (2019). *The Global Competitiveness Report 2019*. Geneva: World Economic Forum.
- Seers, D. (1969). The meaning of development. *International Development Review*, 11(4), 3-4.
- Sen, A.K. (1992). *Inequality reexamined*. Oxford and New York: Oxford University Press.

- Sen, A.K. (1999). *Development as Freedom*. New York and Oxford: Oxford University Press
- Sen, A.K. (2009). *The Idea of Justice*. Cambridge, MA: The Belknap Press of Harvard University Press.
- Sen, A.K. (2020). *A better society can emerge from the lockdowns*. Financial Times, 15 April 2020, available at <https://www.ft.com/content/5b41ffc2-7e5e-11ea-b0fb-13524ae1056b> (Last accessed, 29 May 2020).
- Sen, K. (2013). The Political Dynamics of Economic Growth. *World Development*, 47, 71-86.
- Smith, A., Stirling, A., & Berkhout, F. (2005). The governance of sustainable socio-technical transitions. *Research Policy*, 34, 1491-1510.
- Smith, K. (2000). Innovation as a systemic phenomenon: rethinking the role of policy. *Enterprise & Innovation Management Studies*, 1(1),73-102.
- Stewart, F. (2005). Groups and capabilities. *Journal of Human Development*, 6(2), 185-204.
- Stiglitz J.E., Lin J.Y., & Monga C. (2013). *The Rejuvenation of Industrial Policy*. Policy Research Working paper, No. 6628, Washington, D.C.: The World Bank.
- Stiglitz, J.E., & Lin, J. Y. (Eds.) (2013). *The Industrial Policy Revolution I: The Role of Government Beyond Ideology*. New York: Palgrave Macmillan
- Stiglitz, J.E. (2020). *World leaders must unite in tackling COVID-19*. World Economic Forum and Project Syndicate, 8 April 2020 available at <https://www.weforum.org/agenda/2020/04/internationalizing-coronavirus-covid19-globalization-leadership/> (Last accessed, 29 May 2020).
- Syrquin, M. (1988). Patterns of structural change. In H. Chenery & T.N. Srinivasan (Eds.). *Handbook of Development Economics*. Amsterdam: Elsevier, vol. 1, 203–273.
- Syrquin, M. (2008). Structural Change and Development. In A.K. Dutt & J. Ros (Ed.). *International Handbook of Development Economics*, Cheltenham: Edward Elgar Publishing.
- Tassinari M. (2019). *Capitalizing Economic Power in the US. Industrial Strategy in the Neoliberal Era*. International Political Economy Series, Palgrave Macmillan.
- Tisdell, C. (1988). Sustainable development: Differing perspectives of ecologists and economists, and

relevance to LDCs. *World Development*, 16(3), 373-384.

Tullock, G. (1967). The welfare costs of tariffs, monopolies, and theft. *Western Economic Journal*, 5(3), 224-232.

UN (2015). *Transforming our world: the 2030 Agenda for Sustainable Development*. Resolution adopted by the General Assembly of the United Nations (A/RES/70/1), 25 September 2015.

UN (2020). *SHARED RESPONSIBILITY, GLOBAL SOLIDARITY: Responding to the socio-economic impacts of COVID-19*. United Nations Sustainable Development Group, March 2020

UNDP (1990). *Human Development Report 1990*. United Nations Development Program, New York and Oxford: Oxford University Press

UNDP (1996). *Human Development Report – Economic growth and human development*. United Nations Development Program, New York: Oxford University Press.

UNIDO (2014). *Inclusive and Sustainable Industrial Development. Creating shared prosperity, Safeguarding the environment*. Wien: United Nations Industrial Development Organization.

UNIDO (2017). *Structural Change for Inclusive and Sustainable Industrial Development*. Wien: United Nations Industrial Development Organization.

Venkatapuram, S. (2020). Human Capabilities and Pandemics. *Journal of Human Development and Capabilities*, 21,3, 280-286.

WCED (1987). *Our Common Future (Brundtland Report)*. World Commission on the Environment and Development, Oxford: Oxford University Press.

Weber, K.M., & Rohracher, H. (2012). Legitimizing research, technology and innovation policies for transformative change. Combining insights from innovation systems and multi-level perspective in a comprehensive 'failures' framework. *Research Policy*, 41, 1037-1047.

WEF (2020a). *Emerging Priorities and Principles for Managing the Global Economic Impact of COVID-19 - Chief Economists Outlook*. Geneva: World Economic Forum, April 2020.

WEF (2020b). *How to rebound stronger from COVID-19. Resilience in manufacturing and supply systems.*

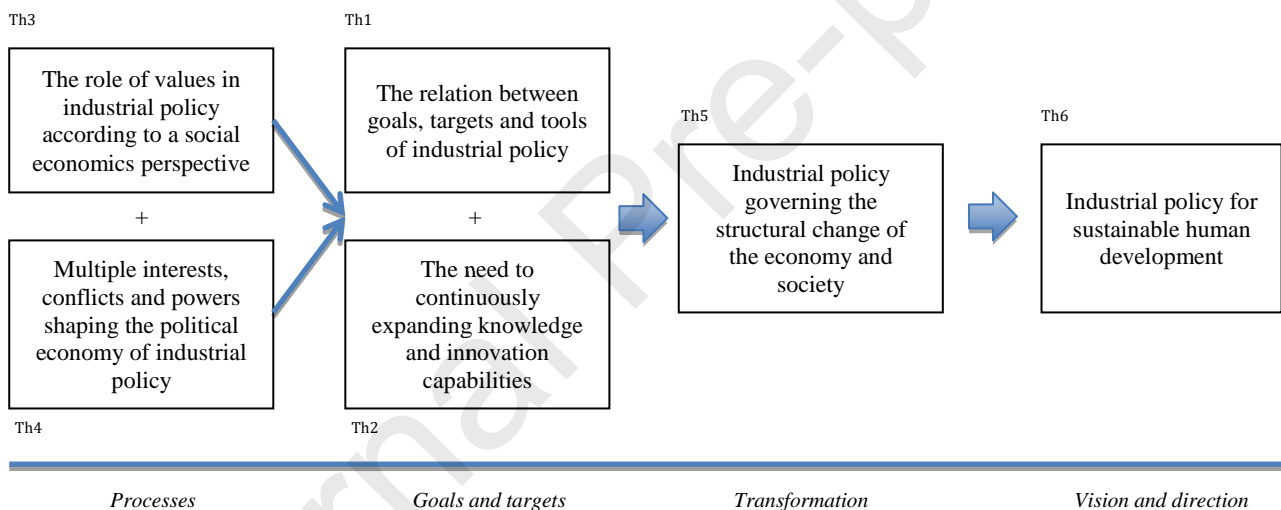
White paper, in collaboration with Kearney. Geneva: World Economic Forum, April 2020.

WEF (2020c). *The Impact of COVID-19 on the Future of Advanced Manufacturing and Production.* Geneva:

World Economic Forum, June 2020.

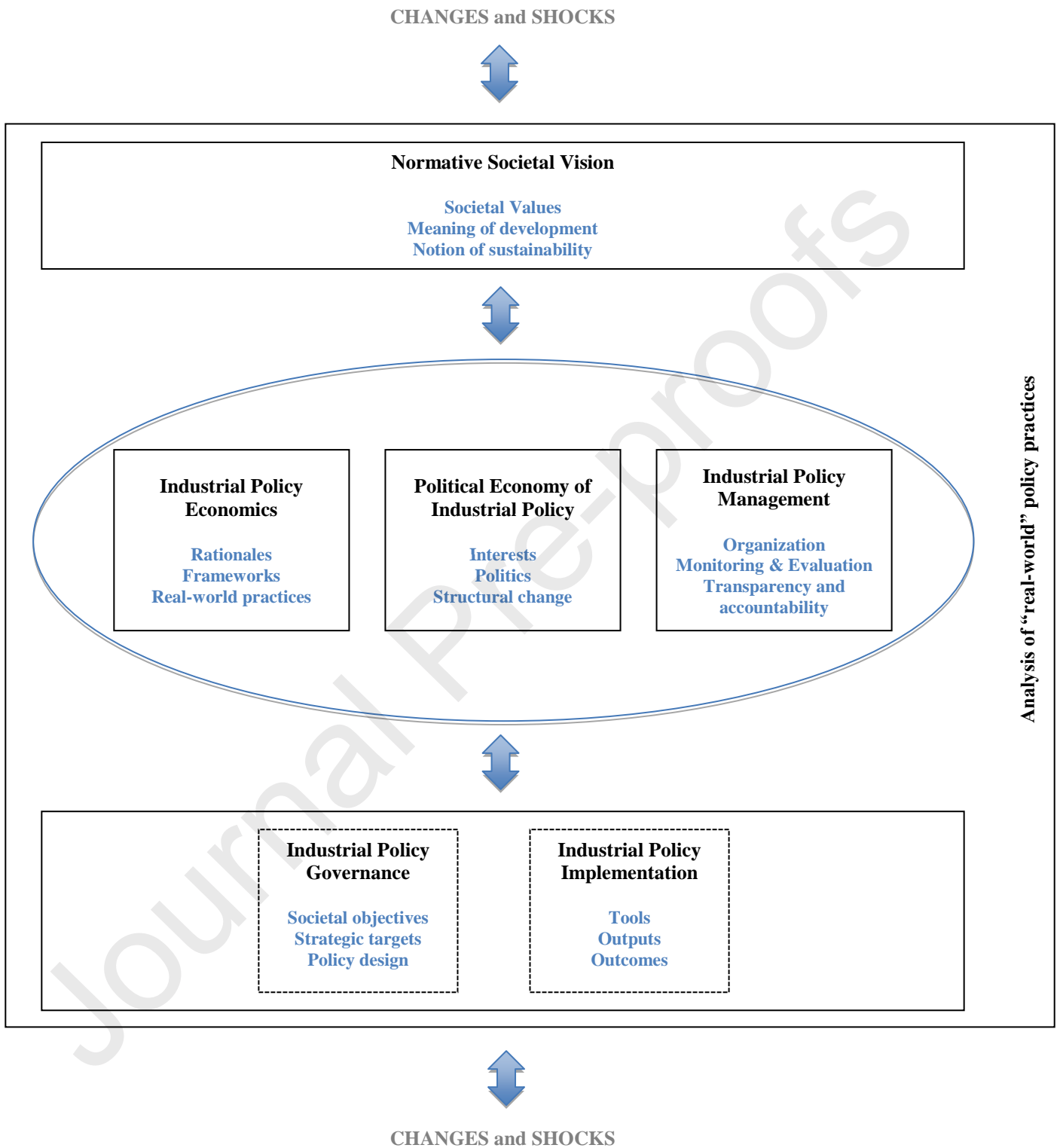
World Bank (2009). *What is Inclusive Growth?*. Washington DC: The World Bank.

Figure 1. The contribution of different theoretical pillars to a new integrated framework on industrial policy



Source: Authors

Figure 2. Industrial policy-making in the post-Covid19 era



Source: Authors

1. The Covid19 pandemic urges us to advancing a new and different framing on government intervention to properly serve the public interest.
2. Production dynamics in every country are highly affected by the pandemic, with drastic changes that might become structural in our economies.
3. A turning point on the connection between industrial policy, sustainability and development has been reached to tackle wide societal challenges.
4. A new analytical framework with real-world implications is needed to support industrial policy governance and implementation.
5. Industrial policy in the post-Covid19 era should steer the structural change of our economies and societies towards sustainable human development.