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The Idea of Justice in Innovation: Applying Non-Ideal Political Theory to Address Questions of Sustainable Public Policy in Emerging Technologies

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Abstract: Justice as such is not a new idea. Since the time of Plato and Aristotle, justice has been conceived as a moral and political standard of how people ought to conduct themselves and relate to one another in a fair society and institutions. However, even though principles of justice and related theories have been used to provide guidance to social and political actions, technological innovation remains an area of policy and practice in which justice cannot be easily applied. This is not only due to the complex process of generating new technologies and their unpredictable impact on social relations and institutions but also to perceptions of value neutrality in the innovation process. Such perceptions make public policy difficult to sustain. Nevertheless, innovation is a human action that is guided by both ethical norms and interests and is significant for justice. Emerging technologies create opportunities for promoting justice, but at the same time, they also pose risks to injustice. This paper is of theoretical nature and aims to explain why justice needs to provide the normative direction of innovation systems and related public policy in the 21st century. Through a critical review of the literature, the paper argues that justice as such is a non-ideal standard which is significant for the legitimacy of emerging technologies and related developmental change. The normative direction of innovation systems in the 21st century depends on non-ideal principles of equity, participation, and recognition. These principles embody sustainable public-policy solutions to problems of unequal generation and diffusion of emerging technologies.

Keywords: innovation; justice; fairness; emerging technologies; politics; policy

1. Introduction

Justice as such is not a new idea. Since the time of Plato and Aristotle, justice has been conceived as a moral and political standard of how people ought to conduct themselves and relate to one another in a fair society and institutions. However, even though principles of justice and related theories have been used to guide social and political actions, technological innovation remains an area of policy and practice in which justice cannot be easily applied. This is not only due to the complex process of generating new technologies and their unpredictable impact on social relations and institutions, but also to perceptions of value neutrality in the innovation process. Such perceptions make public-policy interventions difficult to sustain in the long term. In a recent paper, Papaioannou and Srinivas [1] pay closer attention to such perceptions, analysing the relationship between technological change and values. What becomes clear from their analysis is that innovation is a human action; it is intentional and guided by both economic and ethico-political values, including freedom, equality and social justice. Indeed, the latter set of (non-economic) values is crucial for public-policy and practice. For this reason, it is appreciated by an increasing number of researchers [2–6]. Several schools of thought within innovation studies acknowledge that there is no such thing as pure calculative human action. Indeed, innovation is tied to moral and political values the same way it is tied to economic values, e.g., use and

exchange and utility values. Markets and innovation systems are value-laden institutions which evolve through a historical process of conflict of values and interests [7,8].

As a value-laden human action, innovation is crucial for social justice. In a recent article, Buchanan et al. [9] stress that innovation creates favourable conditions for achieving social justice but also poses risks of injustice, i.e., it can exacerbate existing injustice or it can generate new injustice. However, it might be argued that innovation as such is not only a means of justice. Rather, it also presupposes justice in order to be legitimised. This theoretical paper draws on a critical review of the literature to insist that justice is a non-ideal standard which is significant for the success and acceptance of emerging technologies. The paper's purpose is to explain why this standard can provide normative direction to innovation systems in the 21st century. By using the term "non-ideal" here, I emphasise the importance of "non-abstract" or "concrete" theorising of justice in innovation. When non-ideal principles of equity, recognition, and participation are embedded in (radical and/or incremental) innovations, different publics tend to support their consolidation and scaling up through sustainable public policy for the sake of public good. Therefore, these innovations succeed in achieving legitimacy for changing technological and social paradigms.

Certainly, the idea of justice in innovation is not only about fairly distributing the benefits and costs of new technologies but also about equalising social relations in knowledge generation and utilisation. This means that when it comes to innovation, we have reasons to develop sustainable public policy to ensure not only fair diffusion of new products and services but also equal relations between social actors, including innovators, regulators, and various publics. Eliminating social relations of domination and oppression in knowledge, generation, and utilisation should be the main objective of a non-ideal theory of justice in innovation that can inform sustainable public policy.

The remainder of this paper is organised as follows: Section 2 discusses the non-ideal perspective of justice. Section 3 applies this perspective in emerging technologies. Section 4 focuses on the role of public actions in promoting justice in innovation. Section 5 concludes by summarising the overall argument of this paper.

2. The Non-Ideal Perspective of Justice in Innovation

Before I discuss the idea of justice in innovation and related public policy, it might be worth clarifying justice from a non-ideal perspective. Certainly, there are different types of justice, including legal justice. However, my focus here is on social justice that is central to ethics and politics. The modern idea of social justice is historically linked to successive scientific and technological revolutions which have introduced new products and services, paving the way to early industrialisation and development of Western countries. In his last work, *Why Social Justice Matters*, Brian Barry [10] argues that although until about the eighteenth century justice was conceived as a virtue of individuals, the early industrialisation of Britain and France in the nineteenth century shifted the focus of justice on societies' institutions and social relations. According to Barry [10]:

> "What this meant in practice was that a challenge could be mounted to the power of the owners of capital, and to the dominance of the entire system within which capitalism was embedded. The justice of the unequal relations between employers and employees could be called into question, as could the distribution of income and wealth arising from the operation of capitalist institutions and the part played in people's lives by money."

Barry's argument points towards defining justice as an ideal that is about the institutional treatment of all kinds of inequalities, including distributional and relational inequalities. This treatment needs to be impartial, otherwise fairness might be compromised. The idea of "justice as impartiality" defended by Barry and other liberal egalitarians in the Rawlsian tradition of political thought requires " . . . taking everyone's situation and interests into account in determining what is to count as just outcome" [11]. For example, in order to determine what is to count as a just outcome of distribution of innovative resources,

e.g., driverless cars, one needs to consider the situation of everyone, including the situation of disabled people. Potential benefits for mobility and access will not be distributed fairly to everyone unless principles of justice guide careful public-policy design. Indeed, political theory has come up with various constructions in order to secure an impartial answer to the question of "how would you like it if you were in that situation?" [11]. Smith's "impartial spectator" who sympathises with someone's disadvantage [12] and Rawls' "veil of ignorance" that helps individuals to agree on impartial principles of distributive justice [13] are the most well-known examples of constructivism in political theory. This constructivism has influenced public-policy in the sense that it enabled assessing the performance of specific policy measures and schemes against ideal justice benchmarks.

However, this constructivism has also come under fire for its ideal nature and unsustainable policy implications, prompting the formation of a countermovement of non-ideal theory of social justice. Specifically, authors such as Sen [14] and Andersen [2,3] claim that normative theorising about justice cannot be founded upon philosophical constructions or indeed theoretical devices which are abstracted from historical facts. Instead, it can be founded on empirically generated assumptions which succeed to pass a feasibility test, i.e., a test conducted to provide evidence of whether a theory is feasible in the real world. The aim of such theorising should be to mitigate current injustices through sustainable public-policy, instead of moving us from the current unjust state of the world to a perfectly just one [15]. Non-ideal theorists consider a perfectly just world to be empirically impossible.

Although non-ideal theory at first glance appears to be somewhat less ambitious than ideal theory, it deals with issues of partial compliance with principles of justice and unfavourable circumstances. Anderson [16] explains this in terms of the imperfections of human beings. According to her, "A system of principles that would produce a just world if they regulated the conduct of perfectly rational and just persons will not do so when we ask human beings, with all our limitations and flaws, to follow them". It is such motivational and cognitive deficiencies in human beings which point towards the importance of empirical investigation and diagnosis of the underlying causes of injustices and then the development of a non-ideal theory that could provide concrete and sustainable policy solutions to problems. As Anderson [16] puts it:

> "Non-ideal theory begins with a diagnosis of the problems and complains of our society and investigates how to overcome these problems. Non-ideal theory does not dispense with ideals but conceives of their function differently from ideal theory. In ideal theory, ideals function as standards of assessment for any society . . . In non-ideal theory, ideals embody imagined solutions to identified problems in society."

Such public-policy solutions might be implemented or tried on the ground in order to mitigate injustices. In this sense, non-ideal theory turns to be more effective in terms of guiding agency in empirically contingent circumstances. It can function as a set of hypotheses to be tested in real world. According to Anderson [16]:

> "We test our ideals by putting them into practice and seeing whether they solve the problems for which they were devised, settle people's reasonable complaints, and offer a way of life that people find superior to what they had before. If they pass the test, this does not validate them outside history. Circumstances change, and new problems and complaints arise, requiring the construction of new ideals. If our ideals fail the test, we need to revise or replace them."

This constant testing of imagined policy solutions to problems of social justice constitutes the main methodology of non-ideal approach. Instead of using ideals as standards of social and political assessment, this theory uses ideals as public-policy tests of reality.

Certainly, a non-ideal theory of justice is not uncontested. One criticism has been that it is difficult to separate such theory from ideal approaches to justice simply because contemporary political theorists tend to display features of both [17]. Another criticism has been that neither ideal theory nor non-ideal theory alone is sufficient for meeting the overall

goal of designing just institutions [15]. Both criticisms lead to the argument that ideal and non-ideal theories need to be combined. For Ypi [17], the alternative of ideal/non-ideal combination is about the pursuing of normative theory in an activist mode that she calls "dialectical". This theory emphasises the interrelation of principles and agency. According to Ypi [17]):

> "The circumstances of particular conflicts and the analysis of existing social practices lead theorists and other agents occupying relevant social roles to reflect on them and to articulate specific interpretations of the concerns and commitments they express. After various stages of revision and having obtained some basic level of plausibility, these interpretations are combined with certain first-order value and give rise to fundamentally appropriate theories, theories that are in turn invoked to guide political action."

Implicitly, Ypi seems to accept the ideal theory's claim that first-order values cannot directly emerge from public action. Rather, she implies that they remain privileged products of some kind of "pure" moral thinking that can then be combined with articulated interpretations of empirical concerns about social and political issues [18]. Similarly, for Volacu [15], it is important to use ideal theory to assess what a perfect just state of the world looks like, but at the same time, it is also important to build a bridge for transition to non-ideal theory to assess how we can move from our unjust world to a comparatively just one. Volacu does not seem to explain why ideal assessments of the world are necessary, given that they are both fact-insensitive and infeasible. Therefore, the question remains: why would institutional designers and other policy makers waste time to begin their assessment from an ideal level and then transit to non-ideal level? Would it not be better for them to begin with empirical investigation and diagnosis of injustices and then transit to the level of agency? It might be argued that the main shortcoming of Volacu's argument is lack of agency in the continuum between ideal and non-ideal theory. In this continuum, one would expect agency to be stronger as one moves toward non-ideal theory and weaker as one moves toward ideal theory (Figure 1). The reason being that non-ideal theory is bottom up and therefore agency dependent, especially when it comes to derivation of (non-ideal) principles. In contrast, ideal theory is top-down and therefore agency independent when it comes to derivation of (ideal) principles.

<u>**Ideal Theory**</u>　　　(weaker agency) -4 -3 -2 -1 **0** +1+ 2 +3 +4 (stronger agency) <u>**Non-Ideal Theory.**</u>

Figure 1. Ideal/non-ideal theory continuum.

Figure 1 can be operationalised to highlight the main difference between Rawlsian and Senian theories of justice. Agency is less apparent in *A Theory of Justice* where Rawls [13] derives his ideal principles from behind a veil of ignorance in the original position than it is in *The Idea of Justice* where Sen [14] defends his capability approach in non-ideal terms. Sen [14] stresses that the idea of justice " . . . is ultimately connected with the way peoples' lives go . . . " and whether they can become capable to be and do what they chose. However, his notion of "agency freedom" mainly includes goals of individual wellbeing and not goals of political agency that are focused on changing social relations and institutions in accordance with demands of justice. Although Sen [14] responds to his critiques rejecting that he is methodologically individualist, he also admits that his primary concern is agency of persons and not of groups. This has implications for public action and policy which are focused on addressing relational and institutional injustices. Oppressive social relations and institutions through which people exercise power, dominate, exploit, and marginalise others can only be changed through collective agency, including campaigns and actions of social movements as well as sustainable public policy (Papaioannou, 2018). A non-ideal theory of justice should therefore subscribe to pragmatism by endorsing public action and policy as important means of change. Public action emerges when empirical identification and causal explanation of injustice raises the question of " . . . what can and ought to be

done about it, and who should be charged with correcting it" [16]. Indeed, as Harvey [19] also points out, social mobilization and organisation are driven by bottom-up claims of social justice. Such claims are political and require both evaluation and attribution of political responsibility for change. In terms of evaluation, it might be argued that judgements about social injustices can be based on normative reflections which are both historically and socially contextualised. This is what Young [20] regards as "critical theory". In her view, "Critical theory presumes that normative ideals used to criticise society are rooted in experience of and reflection on that very society, and that norms can come from nowhere else."

Young's critical theory and Anderson's non-ideal theory converge in several points, but one of them is key: their understanding of normative principles of justice as bottom-up developments of public action. Young [21] describes the typical public activist as follows:

> "The activist is committed to social justice and normative value and the idea that politically responsible persons ought to take positive action to promote these. He also believes that the normal workings of the social, economic and political institutions in which he dwells enact or reproduce deep wrongs—some laws or policies have unjust effects or social and economic structures cause injustice, or non-human animals and things are wrongly endangered and so on . . . Besides being motivated by a passion for justice the activist is often propelled by anger or frustration at what judges to be the intransigence of people in power in existing institutions who behave with arrogance and indifference towards injustices the activist find they perpetuate."

By contesting relations of power, domination and oppression, public activists generate egalitarian principles of justice which go beyond distribution of resources and towards equalisation of social relations. In his *Inclusive Innovation for Development*, Papaioannou [18] draws on empirical examples to formulate these principles as follows:

Equity: all persons are of equal moral worth and deserve to stand in relations of equality to one another in the process of innovation generation and distribution.

Recognition: all persons ought to be recognised and respected as equals in terms of their basic needs for innovation.

Participation: all persons are entitled to equal rights of participation in the innovation process of their societies.

These three principles can be defended on non-ideal grounds. They are non-ideal principles of justice because everyone who follows them in his/her innovation context has an effective voice in their consideration and can agree to them without coercion. For innovation and related policy to be just, they must follow these principles, enabling all to meet their needs. In this sense, just innovation principles ought to be egalitarian, thus preventing people from entering superior–inferior relations in the social process of innovation. Faces of oppression, whether they be marginalisation, hierarchy, domination, or exploitation [20], have no place in innovative communities of equals. Such communities are democratic in the sense that innovators, regulators, and users are not in relations of hierarchy with one another but in relations of equality. Relations of equality as such ought not to be influenced by naturally acquired talents and asymmetries of knowledge, material resources, opportunities, and capabilities. Rather, they ought to be based on social cooperation and the sharing of ideas and resources.

Relations of equality might resolve the theoretical and practical tension between profit incentives and social justice. As I have argued elsewhere, there is a perception that " . . . when innovative people take home socially just pay, they innovate less than otherwise might and as a result economic development is slow and poor people are worse off than they are when the activity of innovation is rewarded" [22]. However, given that the focus of justice in innovation is on equality of social relations, the generation of novel products and processes can be still rewarded (and hence incentivised) with the proviso that such rewards do not create relational inequality between innovators, regulators, and publics. This implies

abolishment of some intellectual property rights (IPRs) and instead implementation of other policy instruments, including prizes and social recognition of innovative people.

If the innovation process of a society was wholly just, the principles of equity, recognition, and participation would be probably reflected in every relation between innovator, regulator and user. As a result, no innovative product and/or process would be exclusive of the interests and aspirations of low-income people. Non-ideal principles of justice in innovation embody imagined public-policy solutions to identified problems of knowledge hierarchies and power asymmetries in technological change, domination, and oppression of local needs. This implies that their "negative aim" is not so much to eliminate the impact of brute luck on "who gets what" but to end domination and oppression; their "positive aim" is not so much to ensure a perfect distribution of innovative resources but to create a society in which people, including innovators, regulators, and publics, are in relations of equality with each other [23]. Inequality of social relations is objectionable not only because it reflects humiliating differences in status and power, inequality of opportunity, and unfairness of political institutions and violation of equal concern [24] but also because it undermines social cohesion and reproduction. To put it another way, no society can survive long-term unless shared institutions, including the state and global institutions, ensure that social bonds are maintained through enforced non-ideal standards of social equality and respect to citizens.

3. Non-Ideal Justice and Emerging Technologies

How does the non-ideal perspective of justice apply in emerging and innovative technologies? As has been already stressed, innovation is a human action. This kind of action is about novelty. According to Papaioannou [18] "Whether it be doing something (a product or a process) new to the firm, new to the market or new to the world, or something old in new ways, the concept of innovation describes the restless efforts of human beings to provide novel solutions to problems and to transform their technical and socio-economic environment."

The prominence of innovation in our lives in the 21st century is evident. Emerging technologies, ranging from artificial intelligence (AI) and machine learning to big-data analytics and new life sciences such as gene editing, increasingly transform our productive capacities, health, and social relations. As stressed earlier, these technologies are not value neutral. Rather, they embody values and interests which are often in line with hegemonic, political, and policy narratives such as neoliberalism, failing to meet the requirements of social justice [25]. For example, AI appears to impact unfairly on labour markets pushing low-skilled and high-skilled workers alike to unemployment. There is growing empirical evidence that suggests the beneficiaries of accelerated innovation in the 21st century are just a few high-skilled workers, whereas the losers are many [26–28]. In the developing world, the impacts of automation might be even more negative than in the developed world, because in the developing world, there are more manual jobs to be lost through labour-substituting innovation than in the developed world. The current World Bank [29] estimation is for about 1.8 billion jobs to be threaten by emerging technologies in the developing world. This potential outcome of technological innovation in the 21st century is predominantly unjust given that it leaves many people worst off. Therefore, it requires attribution of political responsibility to policy and practice for changing the direction of innovation towards a more just outcome.

In the fourth industrial revolution, there is consensus for the need to steer accelerating technological shifts towards more inclusive outcomes [30]. Especially in the developing world, this need is obvious. Currently, 1.2 billion people lack access to electricity [31], 4 million people die each year from indoor air pollution due to lack of clean energy, and 800,000 children die each year from preventable diseases [32]. What is even more worrying is that the rate of poverty reduction has halved since 2013 [33] and extreme poverty is increasing in certain areas such as in Sub-Saharan Africa [34]. This trend is bound to become worse in the aftermath of the Covid-19 pandemic. As projections by Hoy and

Sumner [1] indicate, countries will need to achieve historically unprecedented growth levels to reduce poverty and meet sustainable development goals (SDGs) by 2030. As such, the SDGs seem to reflect the consensus for the need of justice in innovation that leads to growth. In this sense, they redefine the mission of science, technology, and innovation as the further reduction of poverty and the elimination of extreme deprivation.

Clearly then, if non-ideal justice is (and ought to be) a foundational concept in innovation and development, it is crucial to investigate its application in emerging technologies. This application is challenging in terms of principles of equity, recognition, and participation. Emerging technologies are fast diffusing in areas such as education, healthcare, logistics, development, and humanitarian assistance. For example, AI and machine learning already provide more accurate diagnosis of some diseases than doctors. However, as stressed above, this diffusion of emerging technologies is currently unequal, leaving too many individuals and their societies behind. In this sense, no requirements of social justice seem to be met. Emerging technologies appear to reflect relations of inequality in the process of innovation generation and diffusion, prioritising some needs (of high-income populations) and marginalising others (of low-income populations). The latter's needs often fail to be communicated into innovation process through participation.

Certainly, in an increasingly digital world, high-tech innovations challenge traditional models of equality, threatening the essence of human rights, i.e., inviolability of human life [35]. Take for example big-data analytics: it potentially undermines rights to security and privacy. Given that individuals are producers and users of data through interconnected devices which can monitor their everyday lives and health, the question of who owns (and who ought to own) these data becomes fundamental. As Risse [35] points out, "Unequal ownership of data will have detrimental consequences for many people in society ... if the power of companies such as Alphabet, Apple, Facebook, or Tesla is not harnessed for the public good, we might eventually find ourselves in a world dominated by companies ... ". Such unjust relations of domination and oppression are no longer future scenarios. Recent scandals such as those of Cambridge-Analytica and Facebook reveal the need for public policy and regulatory frameworks which enforce non-ideal obligations of equity, recognition, and participation for emerging technologies. These obligations derive from the very nature of innovation that is predominantly cooperative and is based on recognition of equal respect. The advantage of non-ideal justice in innovation is that it can address not only issues of fair ownership, use, handling, and access of data [36] but also issues of equal relations, respect, and participation. This implies that non-ideal justice in innovation can guide change in the very process of generation of new technologies and not just their ownership.

Public policy and regulatory frameworks which derive from non-ideal justice in innovation would aim to prevent big-data technologies from exacerbating structural inequalities at national and global levels. This would have further impact on governance and regulation of AI that is based on algorithms. The latter can do things that can be coded, but they require access to enormous amount of data of human activity and other processes in order to enable execution of tasks. Particular types of AI such as machine-learning technologies promise to make more accurate predictions of our habits, drive cars more safely than we do, take care of our health, etc. According to Risse [35], such emerging technological innovations question the implicit assumption of hierarchical superiority of humankind. In his view, new generations might even grow up with intelligent machines and therefore might be attached to them in such ways that would prevent them from switching off. He refers to three examples to illustrate his argument:

> "Already in 2007, a US Colonel called off a robotic land-sweeping exercise because he considered the operation inhumane after a robot kept crawling along losing legs one at time ... A humanoid robot named Sophia with capabilities to participate in interviews, developed by Hanson Robotics, became a Saudi citizen in October 2017. Later Sophia was named UNDP's first-ever innovation cham-

pion. . . . Jeff Bezos recently adopted a dog called SpotMini, a versatile robotic pet capable of opening doors, picking himself up and even loading the dishwasher."

Apart from deeper philosophical questions of consciousness and morality of superintelligence that Risse [35] asks, there are also questions of justice which concern the kind of world these innovations create. To be sure, none of these innovations has been developed by taking into consideration issues of relational equality and respect, let alone involving the poor, especially in the developing world, in the process of knowledge generation and exploitation. On the contrary, as some researchers [37] point out, the risk of inequality is embedded in the technologies themselves. Thus, it is almost certain that both Sophia and SpotMini kinds of super intelligent entities would satisfy the needs of rich people for perhaps insignificant luxuries (e.g., opening doors and loading dishwashers) and exclude the needs of poor people for significant and fundamental improvements in food, energy health, and the environment. The latter set of needs are not regarded as priorities for R&D investment. The world's R&D spending was about 1 trillion US dollars in 2010 and mainly responded to global market demand for such unequal technologies. Global innovation policy is driven by global market forces and not necessarily by global priorities. Therefore, global innovation policy tends to serve the interests of the better off and the powerful. This is the reason why emerging technologies often display complete lack of equal concern and respect for the poor and also for other groups.

Take for instance women and gender relations. There are already documented algorithm biases against women, e.g., computers sending management-level job alerts to more men than women. In her recent book *Automating Inequality: How High-Tech Tools Profile, Police and Punish the Poor* [38], Virginia Eubanks shows how data mining, policy algorithms, and predictive risk models impact unfairly on poor communities. She uses the term "digital poorhouse" to describe the unfair outcome of AI and automation for low-income communities. In doing so, Eubanks identifies a fundamental innovation injustice that exacerbates the already unequal treatment of poor and working-class communities. Her work along with the work of other scholars, including Masiero [39] and O'Neill [40], show that "dataveillance" [41] disadvantages the poor. At a local level, dataveillance is used to assure that people are not abusing welfare funds and undocumented immigrants are tracked by digital systems.

At a global level, there is an increasing number of data-driven discrimination cases. According to Taylor [41], one of them is " . . . India's biometric population database, known as Aadhar. The database is the World's largest with over a billion records and was launched in 2009 with the stated aim of combating welfare fraud . . . However, the design of technologies . . . in fact ensures that the poorest are the worst served by Aadhar. The system's design does not acknowledge the materiality of poverty, being unable to "authenticate those who work with stone, cement, limestone and those over the age of 60."

In 2020, the outbreak of Covid-19 has exacerbated dataveillance at both local and global levels. As countries such as China, Singapore, South Korea, Hong Kong, and others race to contain the virus, dataveillance technologies have been deployed to monitor individuals' health and movements. A proliferation of government-mandated apps, enabling collection of private information such as location of individuals, names, national ID numbers, etc., has raised concerns about violation of human rights and fears of normalising future surveillance.

These examples of national and global uses of innovation reveal two things:

1. Moral and political distinctions between deserving and undeserving poor are embedded in certain technologies leading to unjust outcomes. Such distinctions initially emerged in ideal theories of justice, including liberal egalitarian theories of Ronald Dworkin [42] and G. A. Cohen [43] which too narrowly focused on and favoured conditional distribution of resources and/or welfare benefits. Since then, these ideal theories have influenced neo-liberal policy makers. The latter have been in search of moral and political justifications for investing in unjust innovative technologies and using them to change the real world in their favoured direction [44]. This is the

direction of signalling out the poor and disadvantaged for insulting levels of scrutiny, eventually excluding them from processes of social reproduction.

2. Authoritarian states can deploy technological innovation, violating human rights to privacy and freedom for the sake of responding to health or other emergencies. This also tends to disproportionately affect the already disadvantaged, given that communicable disease outbreaks thrive in poor and densely populated areas of the developed and developing world. People in those areas are often stigmatised and/or disadvantaged as potentially infectious and virus spreaders.

Recently, Practical Action [32] has called for public action to address innovation injustice, moving beyond nation state borders, and demanding an urgent paradigm shift in top-down approach to innovation, technology, and international development. The objective has been to improve access to technologies and ensure people meet their essential needs and develop governance mechanisms that can effectively enable recognition and participation.

4. Public Action as a Pathway to Justice in Innovation

In their well-known article 'Justice in the Diffusion of Innovation' Buchanan et al. [9] clearly defined justice in innovation as:

" . . . the conformity of both the distribution of the fruits of the processes of innovation and of the character of the innovation process itself to the requirement of justice. Justice in innovation may require a pro-active stance: that is, it may be necessary to shape the innovation process in the name of justice, either to try to avoid the production of justice-degrading new technologies or to harness the innovation process for the purpose of promoting justice."

However, this definition still seems to conceive the requirements of justice in ideal terms, failing to encourage an empirical diagnosis of relational inequalities and to identify pathways of rectification in the process of new knowledge generation and exploitation of emerging technologies. Such inequalities range from marginalisation of certain types of knowledge and needs (e.g., indigenous knowledge, needs of BOP, etc.) to domination of multinational companies in global value chains (e.g., oppression of local producers, etc.) and the development of new methods for controlling research agendas (e.g., venture capital partnerships) by these companies [45]. Relational inequalities of course take place not only in the emerging high-tech and radical innovations which I examined in the previous section but also in low-tech and incremental innovations.

Current public policy and regulatory structures such as intellectual property rights (IPRs) promote unequal appropriation and commodification of new products and processes. The cost of innovating these products and processes is often covered by the state. As Block [8] points out, "The historical experience with innovation economy provides powerful arguments against the core assumptions of market fundamentalism. For many technologies, it has not been Adam Smith's invisible hand but the hand of government that has proven decisive in their development." Unequal appropriation and commodification of publicly funded technologies is clearly unjust in virtue of our concern for securing equal relations in innovation. Imagined solutions to innovation inequalities constitute bottom-up requirements of justice. They include openness towards non-R&D generated knowledge, participation of marginalised groups in innovation processes, empowerment of local producers in global value chains, abolishment of certain IPR structures such as patents, etc. After all, as O'Donovan and Schot [46] confirm, science and technology advance not only through high-tech R&D from inside labs but also through low-tech processes in sheds, garages, workshops, and marginalised communities. The idea of justice in innovation applies in both processes. Whether high-tech or low-tech, innovation as such ought to promote a society of equal relations between people.

Buchanan et al. [9] recognise that "Theorising about justice is afflicted . . . with both disagreement and uncertainty. There is disagreement between consequentialists and deontologists, between proponents of 'positive' rights and libertarians, between egalitarians,

prioritarians, and sufficientarians and among egalitarians as to what the 'currency' of justice is (well-being, opportunity for well-being, or resources). In addition, there is uncertainty as to how to move from a given theory's abstract, highest-level principles to lower-level principles with clearer implication for policies and institutions." However, it might be suggested that disagreement and uncertainty are not necessarily faced by a non-ideal theory of justice in innovation. Because the latter considers egalitarian justice to be primarily relational, its currency can be multiple, ranging from wellbeing to resources, provided that it enables people involved in innovation (e.g., innovators, regulators, and publics) to stand in relations of equality to one another.

In addition, it might be argued that a non-ideal theory of justice in innovation does not need to be preoccupied with the question of how to move from highest-level principles to lower-level principles. Public action for justice in innovation, at local and global levels, constitutes a pathway to generation and articulation of bottom-up principles with clear relational and policy implications. Take for example the set of public actions which have come to be defined as grassroots or below the radar (BRI) innovation. This includes low-and-middle income groups which draw on indigenous knowledge and networks of other activists in order to introduce low-tech innovations that solve practical problems in local communities and meet basic needs. Such innovations are often incremental. However, they are significant as collective developments which resolve pressing problems on the ground and meet basic needs of excluded low-income populations [47].

Apart from the economic value of grassroots or BRI for local communities, such low-tech and incremental innovations are potentially disruptive of global social hierarchies and stereotypes about the poor. They promote new types of consumers who are also innovative producers and therefore create new opportunities. As has been stressed elsewhere [47] the existing innovation leaders " . . . are unable to either recognise or exploit these new opportunities. Their trajectories and market antennae inhibit them from fully recognising these new opportunities which are 'below the radar'." Innovation and development researchers [48] have so far studied a number of cases of grassroots or BRI, including the Honey Bee Network (HBN) in India and Social Technologies Network (RTS) in Brazil [49]. These cases generated not only low-tech products such as pedal-powered washing machines and bio-digesters, but also processes of justice and claims for democratisation of innovation systems. Therefore, whether we look at Honey Bee Network (HBN) in India or the Social Technologies Network (RTS) in Brazil, one thing becomes clear: their initiatives from "below" have introduced low-tech innovations which embody non-ideal principles of equity, recognition, and participation as alternatives to high-tech innovations from the top-down which fail to meet the requirements of justice in innovation. Indeed, empirical research diagnoses that innovations from "above" ranging from automobiles and digital technologies to genomics and biotechnologies often exclude the very poor, thereby increasing inequalities, spreading starvation, violence, and despair around the world [18,50]. The main reason for this exclusion is the process of innovation from "above" that is often hierarchical and undemocratic, and it is driven by short-term profit-making incentives which side-line principles of equity, recognition, and participation.

Historical evidence suggests that high-tech innovations and related policies which do not comply (even partially) with principles of equity, recognition, and participation tend to face issues of legitimacy. Such issues are eventually addressed through public action. Take for example the high-tech innovation case of antiretroviral (ARV) drugs in South Africa. Back in 1996, medical researchers found that a combination of three such drugs could control HIV/AIDS. However, this high-tech innovation was patented, which would result in the cost of ARV medicines exceeding US $ 10,000 per patient. Such a cost was unaffordable and therefore exclusive of poor people in developing countries. This was clearly against the principle of equity that demanded public action to remedy the injustice. In 1997, South Africa introduced the Medicines Control Act to allow the compulsory licencing or parallel importation of ARVs. In response, 39 multinational pharmaceutical companies represented by the Pharmaceutical Manufacturers Association

(PMA) filed a lawsuit against the South Africa government, insisting that the Medicines Control Act breached the TRIPS agreement. This case went down as the "Big Pharma v Nelson Mandela" case. Both the US and the EU increased pressure on South Africa, effectively acting in favour of big pharmaceuticals and against the poor. Public activists and campaigners, however, motivated by a commitment to equity and fairness mobilised global opinion against the illegitimate lawsuit and succeeded in turning it into a major public-relations disaster for the pharmaceutical companies [51]. The argument of the activists was loud and powerful: the processes of generation and diffusion of this radical innovation were profoundly unjust. By putting treatment out of financial reach, big pharmaceutical companies were not considering all persons to be of equal moral worth, violating the right to health. This argument of justice in innovation framed a mountain of public pressure that eventually led to withdrawal of the lawsuit. Similarly, in Brazil in 1996, seeking to articulate the universal right of access to ARV drugs, public action and campaigning on behalf of people living with HIV led to compulsory licensing provisions which had impact on the country's pharmaceutical innovation in terms of scaling up essential medicines.

In the 21st century, public activists' claims for justice in innovation appear to be gathering momentum in both the Global North and the Global South. This is because advances in science and technology directly lead to relational and distributional concerns which are framed as concerns of justice in terms of non-ideal principles. Take for example the ongoing concerns about just distribution of health technologies such as innovative vaccines and drugs to combat Covid-19. Such concerns are clearly reflected in the recent World Health Organisation (WHO) solidarity call to public action to " . . . realise equitable global access to Covid-19 health technologies through pooling of knowledge, intellectual property and data" [52]. Supported by global activists such as Global Justice Now, Medecins Sans Frontieres (MSF), and Oxfam GB, as well as developing countries such as Costa Rica, the WHO's solidarity call to public action aims to prevent big pharmaceutical companies to profit from the pandemic to the detriment of equitable access to Covid-19 technologies. Framing this as a claim of justice in innovation, the WHO and public activists are now able to promote a vision of change according to non-ideal principles of equity, recognition, and participation.

The vision of justice in innovation is global. It requires all countries to realise it through public action. However, such realisation cannot happen simultaneously. Rather, it can involve a long process of learning and campaigning. Pragmatically speaking, public activists and campaigners for justice in innovation call for better interaction between formal and informal actors and institutions and focus on localised needs and the equal diffusion of innovations within communities [48,49,53,54]. For example, People's Science Network in India has a membership of 700 thousand and focuses on local needs and aspirations, including health, education, and the environment. As Smith et al. [48] observe:

> " . . . activists' practical confrontation with social and economic issues generated a rich plurality of knowledge. Whether highlighting and addressing the exclusions and inequities in existing grassroots innovation . . . or pointing to injustices in society, a figuring-out of issues through material projects proved both informative and expressive for participants. Movement initiatives and spaces permitted finer-grained and more richly textured forms of knowledge production as compared to, say, more rarefied analysis and argument in manifestos, reports and policy documents."

Activists' demands for radical social and institutional changes increasingly undermine traditional and hierarchical innovation systems. Such changes involve conflict politics and policies that constitutes the foundation of a non-ideal theory of justice in innovation. Through such politics and policies, activists pave the way for a normative direction of innovation that is more transformative of people's lives and more consistent with the demands of justice. This direction does not only mean opening up innovation to those who, up till now, have been excluded from use of the high- and low-tech products and processes that are crucial for their survival, but also constructing an entirely new set

of social relations among the actors involved in the generation and diffusion of new technologies. This is of course not to say that public activists always enable socially just technologies through their demands on public policy. There are also cases in which public activists have blocked or opposed technologies with huge potential for social justice, e.g., GM food technologies and medical application of genetic engineering technologies (gene therapy). In these cases, concerns were not so much about social inclusion but about risk and safety, which eventually undermined public confidence and constrained technological innovation. Especially in the case of GM, deliberative exercises and the public debate with strong participation of activists sent out the message that people were uneasy about these technologies and mistrusted both government and multinational companies [55].

It might be maintained that a just approach to innovation presupposes that public action succeeds to legitimise technologies which comply (even partially) with non-ideal principles of equity, recognition, and participation. All technologies, including those of national defence, require some level of legitimacy in order to survive in the long run. Some theorists, including Heeks and Renken [36] and Taylor [41] attempt to integrate different aspects of justice in innovation, e.g., data justice into the overarching framework of Sen's capability approach, emphasising the importance of freedoms that people value with regard new technologies. Indeed, this approach embeds non-ideal principles of equity, recognition, and participation which can be operationalised in different contexts. In this sense, in different contexts, policy and regulation ought to require fairer share of benefits and risks of innovation in order to increase capabilities and establish a society of equals. This is crucial for changing the direction of innovation systems towards delivering technologies for just social, economic, and environmental outcomes. Failure to do so could exacerbate technological anxiety in the era of fourth technological revolution. In a recent book, Juma [56] has argued that such anxiety and controversies arise from the following tension:

> " . . . the need to innovate and the pressure to maintain continuity, social order and stability . . . The tension between novelty and stability arising from transformational innovation is a leading source of public controversies and policy challenges."

It might be suggested that maintenance of continuity, social order, and stability depends on whether transformational innovation is in fact socially just or unjust. The proliferation of new technologies requires sustainable public policy to engage in foresight exercises and advanced assessments of the potentially unjust and disruptive effects of innovation over decades. Indeed, as Juma [56] also recognises:

> "In most cases, opposition to new technologies arises from a sense of exclusion. It is about understanding the subtle distinctions between technology as products and technology as platforms for generating new solutions that may not be priority of the sales departments of foreign firms. It is not a surprise though that the absence of inclusive strategies leads to intense debates over questions of justice . . . The case for inclusive innovation is even more urgent and income disparities around the world become increasingly associated with technological innovation."

Juma's argument clearly considers justice and inclusion to be key factors for the legitimacy and the scaling up of emerging technologies. Claims for equal participation, recognition, and access to these technologies fall into this category of justice. Public activists for justice try to make explicit that innovation is inherently political. This is because they are fully aware of the political fact that innovations shape people's lives and impact on social institutions in profound and pervasive ways. By responding to injustice, they try to equalise and democratise social and institutional frameworks.

5. Conclusions

This paper has sought to discuss ideal and non-ideal theories of justice, demonstrating the importance of non-ideal theory for addressing questions of inclusivity in emerging

innovative technologies and related public policy. It has argued that such innovative technologies presuppose justice in order to be accepted and legitimised as a positive force of change in society. However, only non-ideal principles of equity, participation, and recognition can embody sustainable public-policy solutions to empirical problems of unequal generation and diffusion of emerging technologies. The normative direction of innovation systems in the 21st century very much depends on such principles generated from the bottom-up through public action for justice in innovation. This idea of justice in innovation is predominantly political because it focuses on social relations of the generation and diffusion of new knowledge and emerging technologies. It therefore presents inclusion not simply as an abstract ideal but as a concrete and relational condition framed in non-ideal terms of justice. This is an approach that ideal theories of justice cannot grasp due to their lack of empirical foundations that leads to sustained idealism.

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References

1. Hoy, C.; Sumner, A. Growth with Adjectives: Global Poverty and Inequality after the Pandemic. In *Working Paper 537*; Centre for Global Development: Washington, DC, USA, 2020; Available online: https://www.cgdev.org/publication/growth-adjectives-global-poverty-and-inequality-after-pandemic (accessed on 24 February 2021).
2. Morgan, J. The Contemporary Relevance of a Cambridge Tradition: Economics as Political Economy, Political Economy as Social Theory and Ethical Theory. *Camb. J. Econ.* **2015**, *2*, 663–760. [CrossRef]
3. Caldas, J.C.; Costa, A.N.; Burns, T.R. Rethinking Economics: The Potential Contribution of the Classics. *Camb. J. Econ.* **2006**, *31*, 25–40. [CrossRef]
4. Tsakalotos, E. Homo Economicus and the Reconstruction of Political Economy: Six Theses on the Role of Value in Economics. *Camb. J. Econ.* **2005**, *29*, 893–908. [CrossRef]
5. Davis, J.B. *The Theory of the Individual in Economics: Identity and Value*; Routledge: London, UK, 2003.
6. Srinivas, S. Demand and Innovation: Paths to Inclusive Development. In *Innovation in India: Combining Economic Growth with Inclusive Development*; Ramani, S.V., Ed.; Cambridge University Press: Cambridge, UK, 2014.
7. Block, F. *Capitalism: The Future of an Illusion*; University of California Press: Oakland, CA, USA, 2018.
8. Block, F.; Keller, M. *State of Innovation: The US Government's Role in Technology Development*; Paradigm Publishers: London, UK, 2011.
9. Buchanan, A.; Cole, T.; Keohane, R.O. Justice in the Diffusion of Innovation. *J. Political Philos.* **2009**, *19*, 306–332. [CrossRef]
10. Barry, B. *Why Social Justice Matters*; Polity Press: Cambridge, UK, 2005.
11. Wolff, J. Models of Distributive Justice. 2006. Available online: https://sas-space.sas.ac.uk/678/1/J_Wolff_Justice.pdf (accessed on 25 February 2021).
12. Smith, A. *The Theory of Moral Sentiments*; Oxford University Press: Oxfrord, UK, 1976.
13. Rawls, J. *A Theory of Justice*; Oxford University Press: Oxford, UK, 1972.
14. Sen, A. *The Idea of Justice*; Belknap Press: Cambridge MA, USA, 2009.
15. Volacu, A. Bridging Ideal and Non-Ideal Theory. *Political Stud.* **2017**, *66*, 887–902. [CrossRef]
16. Anderson, E. *The Imperative of Integration*; Princeton University Press: Princeton, NJ, USA, 2010.
17. Ypi, L. *Global Justice and Avant-Garde Political Agency*; Oxford University Press: Oxford, UK, 2012.
18. Papaioannou, T. *Inclusive Innovation for Development: Meeting the Demands of Justice through Public Action*; Routledge: London, UK, 2018.
19. Harvey, D. Social Justice, Postmodernism and the City. *Int. J. Urban Reg. Res.* **1992**, *16*, 588–601. [CrossRef]
20. Young, I.M. *Justice and the Politics of Difference*; Princenton University Press: Princeton, NJ, USA, 1990.
21. Young, I.M. Activist Challenges to Deliberative Democracy. *Political Theory* **2001**, *29*, 670–690. [CrossRef]
22. Papaioannou, T. Sen and Marx on Incentives and Justice: Implications for Innovation and development. *Prog. Dev. Stud.* **2016**, *4*, 1–17. [CrossRef]
23. Anderson, E.S. What is the Point of Equality? *Ethics* **1999**, *2*, 287–337. [CrossRef]
24. Scanlon, T.M. *Why Does Inequality Matter?* Oxford University Press: Oxford, UK, 2018.
25. Papaioannou, T.; Srinivas, S. Innovation as a political process of development: Are neo-Schumpeterians value neutral? *Innov. Dev.* **2019**, *9*, 141–158. [CrossRef]

26. Zehavi, A.; Breznitz, D. Distribution Sensitive Innovation Policies: Conceptualisation and Empirical Examples. *Res. Policy* **2017**, *46*, 327–336. [CrossRef]

27. Alden, E.; Litan, R.E. A New Deal for the Twenty-First Century' Council on Foreign Relations. 2017. Available online: https://www.cfr.org/sites/default/files/report_pdf/Renewing_America_Twenty_First_Century_Deal_OR.pdf (accessed on 15 February 2021).

28. Schlog, L.; Sumner, A. The Rise of Robot Reserve Army: Automation and the Future of Economic Development, Work and Wages in Developing Countries. *Centre for Global Development Working Paper* **2018**, 487.

29. World Bank. The Changing Nature of Work. World Development Report. 2019. Available online: http://documents1.worldbank.org/curated/en/816281518818814423/pdf/2019-WDR-Report.pdf (accessed on 24 February 2021).

30. World Economic Forum. *Dialogue Series on New Economic and Social Frontiers: Shaping the New Economy in the Fourth Industrial Revolution*; World Economic Forum: Geneva, Switzerland, 2019.

31. International Energy Agency. *World Energy Outlook 2016*; OECD/IEA: Paris, France, 2016.

32. Practical Action. *Technology Justice: A Call to Action*; Practical Action Publishing: Rugby, UK, 2016; Available online: https://practicalactionpublishing.com/book/2155/technology-justice (accessed on 24 February 2021).

33. World Bank. LEARNING to Realize Education's Promise. World Development Report. 2018. Available online: https://www.worldbank.org/en/publication/wdr2018 (accessed on 24 February 2021).

34. Oxfam. Public Good or Private Wealth. Oxfam Briefing Paper. 2019. Available online: https://oxfamilibrary.openrepository.com/bitstream/handle/10546/620599/bp-public-good-or-private-wealth-210119-summ-en.pdf (accessed on 24 February 2021).

35. Risse, M. Human Rights and Artificial Intelligence: An Urgently Needed Agenda. 2018. Available online: https://www.hks.harvard.edu/publications/human-rights-and-artificial-intelligence-urgently-needed-agenda (accessed on 24 February 2021).

36. Heeks, R.; Renken, J. Data Justice for Development: What Would It Mean? *SSRN Electron. J.* **2018**, *34*, 90–102. [CrossRef]

37. Smallman, M. Policies designed for drugs won't work for AI. *Nature* **2019**, *567*, 7. Available online: https://www.nature.com/articles/d41586-019-00737-2 (accessed on 24 February 2021). [CrossRef]

38. Eubanks, V. *Automating Inequality*; St Martin's Press: New York, NY, USA, 2017.

39. Masiero, S. Digital governance and the reconstruction of the Indian anti-poverty system. *Oxf. Dev. Stud.* **2016**, *45*, 393–408. [CrossRef]

40. O'Neill, C. *Weapons of Maths Destruction: How Big Data Increases Inequality and Threatens Democracy*; Crown Publishing Group: New York, NY, USA, 2016.

41. Taylor, L. What is data justice? The case for connecting digital rights and freedoms globally. *Big Data Soc.* **2017**, *4*, 1–14. [CrossRef]

42. Dworkin, R. What is Equality? II Equality of Resources. *Philos. Public Aff.* **1981**, *10*, 283–345.

43. Cohen, J.A. On the Currency of Egalitarian Justice. *Ethics* **1989**, *99*, 906–944. [CrossRef]

44. Wolff, J. Fairness, Respect, and the Egalitarian Ethos. *Philos. Public Aff.* **1998**, *27*, 97–122. [CrossRef]

45. Foxon, T.; Kanger, L. *Social Trends and New Geographies' International Panel on Social Progress: Rethinking Society for the 21 Century*; Cambridge University Press: Cambridge, UK, 2018.

46. O'Donovan, C.; Schot, J. Crafting Stories of Technology and Progress: Five Considerations. *Technol. Stories* **2018**, *6*, 2. Available online: https://www.technologystories.org/wp-content/uploads/2018/05/ODonovanSchot_Crafting-Stories_updated.pdf (accessed on 24 February 2021).

47. Kaplinsky, R.; Chataway, J.; Clark, N.; Hanlin, R.; Kale, D.; Muraguri, L.; Papaioannou, T.; Robbins, P.; Wamae, W. Below the Radar: What does Innovation in Emerging Economies have to Offer other Low-income Economies? *Int. J. Technol. Manag. Sustain. Dev.* **2009**, *8*, 177–197. [CrossRef]

48. Smith, A.; Voß, J.-P.; Grin, J. Innovation studies and sustainability transitions: The allure of the multi-level perspective and its challenges. *Res. Policy* **2010**, *39*, 435–448. [CrossRef]

49. Papaioannou, T. How Inclusive Can Innovation for Development Be in the 21st Century? *J. Innov. Dev.* **2014**, *4*, 187–202. [CrossRef]

50. Soares Cluto, M.C.; Cassiolato, J.E. Innovation Systems and Inclusive Development: Some Evidence Based on Empirical Work' Paper Submitted to the International Workshop on New Models of Innovation for Development. 2013. Manchester University. Available online: https://hummedia.manchester.ac.uk/institutes/cdi/news_and_events/SoaresCassiolatoPreWorkshopPaper.pdf (accessed on 24 February 2021).

51. Timmermann, C. Life Sciences, Intellectual Property Regimes and Global Justice. Ph.D. Thesis, University of Wageningen, Wageningen, The Netherlands, 2013.

52. WHO. Making the Response to Covid-19 a Public Common Good. 2020. Available online: www.who.int (accessed on 24 February 2021).

53. Foster, C.; Heeks, R. Conceptualising Inclusive Innovation: Modifying Systems of Innovation Frameworks to Understand Diffusion of New Technology to Low-Income Consumers. *Eur. J. Dev. Res.* **2013**, *25*, 333–355. [CrossRef]

54. Thomas, H.; Fressoli, M.; Becerra, L. Science and Technology Policy and Social Ex/Inclusion: Analysing Opportunities and Constraints in Brazil and Argentina. *Sci. Public Policy* **2012**, *39*, 579–591. [CrossRef]

55. Gaskell, G. Science policy and society: The British debate over GM agriculture. *Curr. Opin. Biotechnol.* **2004**, *15*, 241–245. [CrossRef] [PubMed]

56. Juma, C. *Innovation and its Enemies: Why People Resist New Technologies*; Oxford University Press: Oxford, UK, 2016.