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How has mission-oriented innovation policy addressed justice considerations? A systematic review

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Mission-oriented innovation policies have major justice implications because they aim to radically transform our societies. Although research on these policies rarely engages with the notion of justice, this paper rests on the premise that it has implicitly provided insights that are relevant, and which could function as an entry point for a much-needed debate on mission justice. In response, we identify and explicate implicit considerations of distributive, procedural, recognitional, and restorative justice in the context of missions by means of a systematic literature review. While the scholarly debate on missions has indeed raised relevant questions regarding justice, we find that it has provided few meaningful answers. In particular, scholars seem to overlook restorative justice considerations that could help rectify historical wrongdoing. We highlight the imperative and ways in which scholars and policymakers can engage with justice more explicitly to formulate, implement, and evaluate missions for more just transitions.

Keywords: distributive justice; procedural justice; recognitional justice; restorative justice; just transition; transformative innovation policy.

1. Introduction

In order to address some of our grand societal challenges, policymakers across the globe increasingly turn towards mission-oriented innovation policy (MOIP). While some MOIPs centre around technological achievements (e.g. space programs), attention has recently shifted towards transformative forms of MOIP. Such ‘new’ long-term policy approaches provide ambitious, concrete, and time-bound objectives that require major transformations of our sociotechnical systems (Mazzucato 2018; Hekkert et al. 2020; Janssen et al. 2021). Because MOIP aims to instigate such disruptive transformations, it may come as no surprise that they have significant justice implications.

The adjacent debate on ‘just transitions’ considers such implications and revolves around questions like ‘who wins, who loses, how and why?’ (Newell and Mulvaney 2013: 133). The notion of justice relates to the ways and extent to which stakeholders and the environment are treated in an equitable, fair, and respectful manner (Williams and Doyon 2019). The wicked nature of the problems that MOIP aims to address suggests that there is no single best way of perceiving, understanding, and working with justice considerations. While most stakeholders would support the idea of justice, many of them hold very different ideas of what justice means to them (Dignum et al. 2016). Justice is therefore a contested notion that is ‘inherently plural’ and which draws attention to the multitude of sometimes implicit and conflicting justice considerations (Brackel et al. 2023: 3). These considerations

are crucial for moral reflection and provide insights into how policies should be adapted. As such, policymakers will need to reflect on these in order to formulate, implement, and evaluate MOIPs that are viewed as both effective and desirable (Wiarda et al. 2024).

Although the field of just transitions has extensively studied the role of justice in the context of transitions (e.g. Newell and Mulvaney 2013; Jenkins, Sovacool and McCauley 2018; Williams and Doyon 2019; Kaljonen et al. 2021; Wang and Lo 2021), Urias, Kok and Ulug (2024: 1) rightfully point out that ‘an explicit engagement with the concept of justice is lacking’ in the debate of MOIP. Scholars have criticized MOIP for not sufficiently taking into account normative considerations (Kirchherr, Hartley and Tukker 2023) and call for a better understanding of what we call ‘mission justice’ (Kok and Klerkx 2023; Wiarda et al. 2024).

Building on the just transitions literature, justice considerations generally relate to at least four justice dimensions (c.f., Jenkins et al. 2016; McCauley and Heffron 2018; Kaljonen et al. 2021; Tschersich and Kok 2022; Kok and Klerkx 2023), namely, ‘distributive’, ‘procedural’, ‘recognitional’, and ‘restorative’ justice (Fig. 1). We argue that these four dimensions are particularly relevant for MOIP because they have been conceptualized and used for the context of sociotechnical transitions (Wang and Lo 2021). In addition, these dimensions are domain-agnostic in the sense that they bear relevance across mission domains (e.g. energy, food, climate, etc.) as also implied by the work of Jenkins et al. (2016), Kaljonen

Beyond profit distribution, scholars have implicitly considered how knowledge and innovation is distributed as a consequence of missions. Conventionally, the ‘diffusion of the results outside of the core of participants [was] of minor importance or actively discouraged’, but the outcomes of transformative missions are encouraged to reach as many stakeholders as possible (Robinson and Mazzucato 2019: 939). This is also implicit in the contribution of Van der Loos, Negro and Hekkert (2020) who describe the importance of collaborations between start-ups, knowledge institutes, and incumbents. Similarly, ‘market parties acknowledge increasingly the benefits of sharing knowledge’, but ‘a clear coordination of this knowledge development and diffusion [...] seems to be lacking’ (Coenen, Visscher and Volker 2023: 32). What is more, the extent to which we can address grand challenges is contingent on the system-wide adoption of innovations because ‘only when there is adoption can there be a practical impact of the innovation’ (As also described by Craens, Frenken and Meelen 2022; Valdivieso, Uribe Gómez and Ordóñez-Matamoros 2021: 23). Policymakers can draw lessons from similar challenge-led contexts. In the COVID-19 pandemic, for instance, inadequate data sharing and the hoarding of vaccines in high-income countries resulted in ‘less equity and distribution of vaccine doses to low-income countries [...] making health inequality painfully visible’ (Van De Burgwal et al. 2023: 11–12).

Indeed, MOIP revolves around pursuing socially desirable outcomes (e.g. public value, inclusive growth, solutions for all) and earning the necessary public consent and legitimacy to do so (Kattel and Mazzucato 2018). However, scholars have criticized the ongoing debate for not reflexively considering the possible repercussions of mission-oriented innovation *ex ante* (e.g. Klerkx and Rose 2020; Kirchherr, Hartley and Tukker 2023; Wiarda et al. 2024). If we assess policies only in terms of their benefits, then this is argued to naively skew our perceptions of missions (Henrekson, Sandström and Stenkula 2024a). As Kattel and Mazzucato (2018: 791) put it, ‘what we miss in both scholarly and policy debates is a better understanding of the institutional and political ramifications of mission-oriented policies’. The early identification of low societal acceptance could be a crucial symptom of at least high degrees of uncertainty regarding these ramifications (Wanzenböck et al. 2020). Some scholars underline that although ‘it is unproblematic for private actors to bear high risk, it is difficult to justify, in a democratic setting, that politicians and civil servants take risks with taxpayers’ money in the same way’ (Henrekson, Sandström and Stenkula 2024b: 315). Hence, scholars have argued that politicians are usually willing to take credit for success, but may blame a scapegoat when mission-oriented projects fail (Elert and Henrekson 2021). Accountability regarding (the spending for) mission outcomes is therefore deemed an important requisites for legitimacy (Kok and Klerkx 2023). Citizens might be more willing to accept failures if the government can also demonstrate considerable successes (Mazzucato 2018). But who is at risk when taking such opportunities? Who bears the costs and who reaps the benefits? In other words, who really wins and loses from MOIP (as also questioned by Janssen et al. 2021)? These questions are left unanswered. Applying insights from the academic debate on responsible innovation could lead to more ‘winners’ than ‘losers’ when pursuing transitions, but ‘until we articulate inclusive visions of the future, it is difficult

to start to anticipate what the impacts of the transition will be, and how they can be made more responsible’ (Klerkx and Rose 2020: 5).

Giving substance to distributive justice considerations also draws attention to the challenges for the evaluation of mission outcomes. A fixation on mission goals can be a common pitfall as it may later turn out that these are no longer the most feasible and just scenarios (Klerkx, Turner and Percy 2023). The success or failure of missions is easily contested and therefore depends on who one asks (Kattel and Mazzucato 2018; Nylén, Johanson and Vakkuri 2023). Missions affect stakeholders in different ways and to different extents, and the way one approaches mission governance partly determines whether impacts are distributed fairly. Some scholars argue that techno-centric approaches likely reinforce existing power inequalities that further strengthen the position of incumbents rather than distributing outcomes in more equitable ways (Klerkx and Rose 2020). Such approaches are thus problematic because they benefit the ‘usual suspects’ who thrive from ‘business-as-usual’ (Klerkx and Rose 2020; Elzinga et al. 2023). In the context of circularity missions for example, Elzinga et al. (2023) find that recycling might not be deemed the best solution pathway by stakeholders, but that governments heavily support it in response to lobbyists that defend the interests of incumbents. Pre-existing inequalities reinforce and give rise to distributive injustices when expected end-users (e.g. farmers in an agricultural mission) cannot acquire benefits because they lack the necessary resources to cover developmental costs in the face of risks and uncertainty (Wojtynia et al. 2021). As a result, investments by the state are sometimes contested when they reinforce unsustainable practices of incumbent positions that have strong political links through lobbyists (Rodríguez-Barillas, Klerkx and Poortvliet 2024). Authors therefore urge policymakers to carefully consider how resources and impacts are distributed between public and private sectors, and across ecosystems and communities (Kok and Klerkx 2023). The interests, responsibilities and even rights of stakeholders should be discussed in relation to potential costs and benefits of missions that are being formulated in order to prevent delayed conflict or even grievance. Such ramifications became apparent for the Norwegian maritime mission where a failure to account for financial burdens led to ‘significant price increases, a social outcry and resistance to electric ferries’ (Bugge, Andersen and Steen 2022: 2325–2326).

3.2 Procedural justice

Procedural justice raises question regarding the fairness, transparency, and inclusivity of decision-making processes (Williams and Doyon 2019; Tschersich and Kok 2022). Democratic processes are crucial for missions because they have inherent normative value that may promote procedural justice (Kok and Klerkx 2023). While much of the mission debate emphasizes the importance of inclusion for the legitimacy of missions, Jansen et al. (2021: 442) remind us that inclusion is also ‘essential for *genuinely* addressing the underlying challenge and harnessing the capacity and resources from various groups’ (emphasis added).

In considering procedural justice, policymakers can raise ‘questions about who determines the direction of transformative change?’ (Parks 2022: 1) and ‘who is included and

actors when engaged in anticipatory practices (Rosemann and Molyneux-Hodgson 2023). These claims leave us wondering how possible differences can and should be resolved (e.g. through intermediaries) (Janssen et al. 2023). Governments are said to have an important role in coordinating and aligning actors that clash in contested environments (Elzinga et al. 2023). They are well-positioned to leverage constructive and agonistic approaches to conflict resolution, of which agonistic approaches especially point at power as one of the decisive factors (Wiarda, Coenen and Doorn 2023).

Conflicts and negotiations underline the importance of managing power inequalities in decision-making for procedural justice (as also suggested by Pigford, Hickey and Klerkx 2018; Klerkx and Begemann 2020; Wojtynia et al. 2021; Lehoux et al. 2023). One may think of an uneven distribution of resources, relations, information, and capabilities across actors (Rabadjeva and Terstriep 2020; Henrekson, Sandström and Stenkula 2024a). This also relates to how MOIP could empower vulnerable stakeholders (Kok and Klerkx 2023). Empowerment is arguably a responsibility of policymakers (Elzinga et al. 2023) and Bugge and Fevolden (2019) speak of ‘balanced empowerment’ to describe a government’s ability to delegate power in a dual, more decentralized, structure of bottom-up and top-down interaction. Finding this balance is considered critical for the success of missions (Jütting 2020) partly because a too top-down governance deters the adoption of solutions (Dinesh et al. 2021). Some scholars point out that MOIP could benefit from more decentralized modes of governance by more inclusively involving societal stakeholders in decision-making (Bauwens, Hekkert and Kirchherr 2020; Rabadjeva and Terstriep 2020). Bottom-up processes require political willingness and are prone to new challenges (Rabadjeva and Terstriep 2020), and procedural injustices may emerge if such engagement only takes place in late stages of innovation when its solely concerned with the adoption and contextualization of largely developed solutions (Rosemann and Molyneux-Hodgson 2023). Klerkx and Rose (2020) therefore plead for more engagement in upstream phases of mission-oriented transitions.

3.3 Recognitional justice

Recognitional justice is concerned with representation, consideration, and respectful treatment of stakeholders (Honeth 2004; Whyte 2011). In recognizing stakeholders views, policymakers direct efforts towards stakeholder engagement when formulating missions (Kattel and Mazzucato 2018) because following visions that are ‘determined by only a select group of people (policy-makers or other powerful actors) is unlikely to be fit-for-purpose’ (Klerkx and Rose 2020: 5). As Wanzenböck et al. (2020: 475) put it: ‘[MOIP] runs the risk of providing a one-size-fits-all approach’ that leans on ‘taken-for-granted problem definitions ... while marginalizing opposing voices or discarding complex trade-offs’. Reflexivity and social learning therefore play a crucial role (Coenen, Visscher and Volker 2023; Wiarda et al. 2024) because alternative problem framings are commonly sidelined (Pfotenhauer et al. 2022).

Recognitional justice strongly relates to the recognition of diverse views on problems and solutions (e.g. Wanzenböck et al. 2020; Wiarda et al. 2023; Wojtynia et al. 2021). In the wicked context of missions, stakeholders tend to fundamentally disagree due to differences in values and worldviews (e.g.

knowledge) (Wanzenböck et al. 2020). For example, Schlaile et al. (2022: 95) point out that even ‘sustainability itself is a contested notion meaning very different things to different actors, likewise depending on their worldviews and respective paradigms’. This also means that stakeholders likely disagree on the viability and desirability of solution pathways that are needed to pursue a mission objective (Andersson and Hellsmark 2024). Coenen, Visscher and Volker (2023) reveal such disagreement in the Dutch circular infrastructure sector, which reportedly represents a serious barrier to transition. Mission justice requires policymakers to recognize the diversity of views on solutions because MOIP has ‘provided innovators and firms with new opportunities to frame controversial technologies as offering critical “solutions” to key global challenges’ (Rosemann and Molyneux-Hodgson 2023: 20). Stakeholders can furthermore disagree on who is to blame for the problems of interest. Wojtynia et al. (2021), for example, identify possible recognitional injustices perceived by farmers as they feel unfairly blamed by society for agricultural problems.

Reale (2021) argues that it is precisely disagreement that highlights the necessity for deliberations. Policymakers face serious challenges when stakeholders cannot agree on goals, lack a common vision, and hold diverging agendas (Wojtynia et al. 2021), partly because an unresponsiveness to stifling conflicts can breed resistance (Wanzenböck et al. 2020; Frahm, Doezeema and Pfotenhauer 2022). Some scholars emphasize the importance of more communication and awareness raising as means to develop shared views on problems, solutions, and overarching missions (Schnellenbach 2024), but different viewpoints are usually not resolved through more scientific knowledge as stakeholder simply perceive and value risks and benefits differently (Schlaile et al. 2022). Scholars point out that recognizing and dealing with diverging perspectives, visions, and values requires high degrees of reflexivity (Janssen et al. 2023; Wiarda, Coenen and Doorn 2023), respect (Fielke et al. 2023), trust (Mazzucato 2018), and negotiation (Klerkx and Begemann 2020; Janssen et al. 2021). This closely relates to the plea for forms of constructive (Wiarda, Coenen and Doorn 2023) or productive conflict resolution (Dinesh et al. 2021).

Recognitional justice therefore draws attention ‘demand-pull’ forces from stakeholders like worried citizens, affected individuals, consumers, or institutional activists (Klerkx and Begemann 2020; Mucarsel, Barile and Bhat 2023; Stubbe, Busch-Heizmann and Lutze 2023), which could also open-up opportunities for organizations that are often absent from conventional discourses such as social and solidarity economy organizations (Bauwens, Hekkert and Kirchherr 2020). Kattel and Mazzucato (2018) argue that Germany’s EnergieWende exemplifies how missions would have never happened without social movements. In participatory decision-making, policymakers may therefore need to abandon stereotypical ideas of stakeholders (Stubbe, Busch-Heizmann and Lutze 2023). Parks (2022) similarly points out that policymakers need to discard perceptions of ‘the public’ as a monolithic and singular entity, and start recognizing the diverse publics that emerge around certain topics of concern.

What is needed is stakeholder engagement that moves beyond top-down and uni-directional communication by approaching missions more bottom-up and bi-directional (Rosemann and Molyneux-Hodgson 2023; Wiarda et al. 2024). The more policymakers recognize and empower

In terms of procedural justice, scholars hinted that policymakers should consider who determines the directionality that underpins missions (Parks 2022; De Graaff, Wanzenböck and Frenken 2025). In shaping MOIP, specific attention should go to who is included and excluded in decision-making (Janssen et al 2021), while considering notions of influence, power, and empowerment in the context of collaboration and opposition (as hinted by e.g. Klerkx and Rose 2020; Janssen et al 2021; Kirchherr, Hartley and Tukker 2023; Wiarda et al. 2023).

Recognitional justice urges policymakers to reflexively acknowledge and possibly include different views on problems and solutions in the formulation and pursuit of missions (e.g. Klerkx and Rose 2020; Wanzenböck et al. 2020; Wiarda, Coenen and Doorn 2023; Wojtynia et al. 2021). This requires insights into what stakeholders think should be prioritized and valued (Kok and Klerkx 2023), particularly in local contexts because ‘challenges do not present themselves as the same for every region or country, as underlying problems affect places in different ways and to different extents’ (Wanzenböck and Frenken 2020: 56). Policymakers will need to consider the plurality of stakeholders—particularly that of publics (e.g. Parks 2022; Stubbe, Busch-Heizmann and Lutze 2023; Wiarda et al. 2023). Recognitional mission justice also relates to the ways and extent to which different views on risks and benefits are taken into account, and how the interests of marginalized and vulnerable stakeholders are represented and safeguarded in these processes (Schlaile et al. 2022; Klerkx, Turner and Percy 2023; Stubbe, Busch-Heizmann and Lutze 2023).

Our findings suggest that considerations for restorative justice have largely been overlooked. Indeed, policymakers should learn from the past (Mazzucato 2018), but the ongoing academic debate has so far merely wondered how we can make amends with the past (Kok and Klerkx 2023), and more specifically, how scalability logics inscribed in missions could perpetuate neo-colonial tendencies of the West (Pfotenhauer et al. 2022).

More broadly, this review reinforces the premise that distributive, procedural, recognitional, and restorative justice considerations interrelate in the sense that one consideration urges policymakers to incorporate other considerations. For example, different ideas of blame and responsibility (i.e. recognitional justice) underline the importance of including an opposition (i.e. procedural justice) to collectively determine who should bear costs and reap benefits throughout mission-oriented transitions (i.e. distributive justice).

4.2 A reflection and outlook—what is currently missing?

When reflecting on our review, we find that the debate on MOIP has indeed only implicitly considered dimensions of justice in the formulation, implementation, and evaluation of missions, with a few exceptions (e.g. Kok and Klerkx 2023; Wiarda et al. 2024). This confirms the observation of Urias, Kok and Ulug (2024) that justice is generally viewed as a side effect of MOIP (if considered at all). We furthermore reveal an under-representation of restorative justice considerations which hints that MOIP conceives justice as a primarily forward-looking notion. Moreover, given the mission

debate’s disciplinary roots in economics and innovation sciences, it may come as no surprise that justice is associated with notions of profit sharing, directionality, and the diffusion of innovation. In doing so, it has raised various justice-related questions, but many of which have so far remained unanswered.

We therefore argue that the MOIP debate has insufficiently addressed matters of justice. What is missing is a more explicit engagement with the concept of justice, particularly with an appreciation of politics, conflict, power, morality, and responsibility. In our view, conceptual and empirical contributions should provide a better understanding of how (un)fairly beneficial and harmful impacts are distributed; to what extent decision-making processes can be considered inclusive and transparent; and which values and worldviews are recognized as (in)valid. Such contributions would address justice beyond an economic frame; not just as a side effect or externality, but as a primary concern of missions.

We have argued that distributive, procedural, recognitional, and restorative justice bear particular relevance for missions because they have been conceptualized and applied to socio-technical transitions, and because they are widely applicable as they transcend specific domains (e.g. energy). However, the plural and contextual nature of justice also points at the value of other dimensions and domain-specific forms of justice that can promote mission justice (Schlosberg 2007). More specifically, we see merit in including dimensions such as intergenerational justice (Page 1999; Meyer 2017), epistemic justice (Fricker 2013), and global justice (Moellendorf 2012). Intergenerational justice is particularly relevant because missions are long-term policies that affect different generations across decades. It could guide policymakers in recognizing needs and rights of future generations, and in shaping and distributing mission outcomes fairly. Future research will need to target what mechanisms can help distribute risks and rewards of missions more equitably across generations, and what governance approaches can prevent short-term political cycles from undermining long-term goals. Epistemic justice likewise needs consideration because it is usually not evident whose knowledge is recognized as legitimate or true. In practice, different epistemologies (e.g. scientific, local, indigenous) clash with one another and with diverse normative considerations (Kok and Klerkx 2023). Lessons from global justice would further enrich mission justice because national missions have significant cross-border dependencies and implications (e.g. with the Global South). We wonder, for example, how MOIPs can promote fair distributions of benefits while mitigating existing global inequalities. Answering such questions would link the notion of justice to the emerging debate on the geographies of MOIP (Uyarra et al. 2025).

Domain-specific forms of justice (e.g. environmental justice) can provide insights in relation to certain contexts. For instance, the uptake of regional, local, or city-initiated missions suggests that insights from urban justice may be of value (Nederhand et al. 2023; Avelino et al. 2024a). In such cases, cities and regions are often active agents in re-framing and translating national missions to subnational contexts (Priebe and Herberg 2024; Uyarra et al. 2025). How such appropriated missions can do justice to both local and national values and concerns still remains an important open question

of the mission literature to identify and reveal such implicit justice considerations. Our review confirms this premise and presents a range of considerations that could contribute to mission justice. To some extent, these considerations may have a broader relevance for transformative innovation policy (Diercks, Larsen and Steward 2019; Penna et al. 2023), next to other approaches like transition management and strategic niche management (Rotmans, Kemp and Van Asselt 2001; Schot and Geels 2008). Simultaneously, we believe that the goal-driven and top-down character of MOIP presents some unique challenges that require future research.

Our results show that the ongoing debate on MOIP disproportionately focuses on distributive, procedural, and recognition justice considerations while largely overlooking the area of restorative justice. Mission justice is generally conceived as a forward-looking notion, implicitly concerned with the (economic) side effects of missions. We find that the debate has raised several justice-related questions, but has not yet provided meaningful answers that are grounded in empirics. We have also argued that justice considerations would require greater attention to power and politics, and that we may need to rethink current policy approaches to missions.

Following our review, we advocate for future research that explicitly deals with mission justice across various dimensions (e.g. intergenerational justice and epistemic justice) and domain-specific forms (e.g. energy justice and urban justice), particularly with that of restorative justice. For restorative justice, it is imperative that scholars stop treating the mission concept as a sole forward-looking notion, but also consider historical wrongdoings, path-dependencies, accountability, and lessons, retrospectively.

In advancing mission justice more generally, scholars will not need to reinvent the wheel but can draw valuable lessons from research on just transitions (e.g. Newell and Mulvaney 2013; Jenkins, Sovacool and McCauley 2018; Williams and Doyon 2019; Kaljonen et al. 2021; Wang and Lo 2021). A genuine engagement with justice would entail that ‘injustice is then understood not simply as a “side effect” of transitional [mission] policies but as symptomatic of underlying structural inequalities that remain unaddressed’ (Abram et al. 2022: 1038). Our work lays the groundwork for conceptualizations of mission justice, and advances our understanding of the socio-ethical implications that mission-oriented innovation policy may engender. It urges us to question ongoing practices in decision-making and bottom-up engagement when determining matters of directionality and risk-taking.

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This paper has responded to the explicit calls of scholars to better understand justice considerations for MOIP (Kok and Klerkx 2023; Wiarda et al. 2024). The premise of this paper was that these considerations are often discussed in the literature, without explicitly referring to the concept of justice. We have subsequently conducted a systematic review

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