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Metagoverning the Co-Creation of Green Transitions: A Socio-Political Contingency Framework

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Abstract: While the planet Earth will survive the accelerating climate and nature crisis, humankind may not. As part of its work to halt the global climate and nature crisis, while generating a distributed prosperity, the United Nations has unanimously agreed on sustainable development goals. The achievement of these goals depends on the mobilization of local knowledge and resources, and the creation of a sense of joint ownership over new and bold solutions. Co-creation that brings together relevant and affected actors in emergent processes of collaboration, learning, and innovation offer a path to localized green transitions. However, little is known about how public governance can prompt, support, and scaffold the local co-creation of green solutions. Bridging extant literatures in the field of collaborative and networked governance, this theory-building article aims to identify a number of governance factors conducive for the local co-creation of green transitions. The resulting theoretical framework allows us to conjecture about which governance factors will be critical in different socio-political contexts, thus facilitating future studies of contrasted governance paths to local green co-creation.

Keywords: sustainability; co-creation; governance factors; green solutions; regimes



Citation: Torfing, J.; Ansell, C.; Sørensen, E. Metagoverning the Co-Creation of Green Transitions: A Socio-Political Contingency Framework. *Sustainability* **2024**, *16*, 6776. <https://doi.org/10.3390/su16166776>

Academic Editor: Colin Michael Hall

Received: 21 June 2024

Revised: 1 August 2024

Accepted: 1 August 2024

Published: 7 August 2024



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1. How Should the Co-Creation of Green Transitions Be Governed?

People around the world are suffering from the catastrophic consequences of climate change, the biological degradation of land and oceans, loss of biodiversity, pollution of the air, soil, and groundwater, and accelerated resource depletion, but some have much less capacity to address these problems. Hence, we must act resolutely to produce equitable green transitions (e.g., reducing greenhouse gas emissions, regenerative agriculture, environmental regulation, and circular economy) if we are to turn the tide and secure a prosperous but environmentally sustainable future, that leaves no one behind [1,2]. Green transitions are often conceived as large-scale systemic changes that transform entire sectors or societies, but they also occur at the meso-level of niche innovation and at the micro-level with changes in individual behavior [3]. Here, the focus is on meso-level green transitions that are relatively impactful and can be created by local actors with support from higher-level public authorities. Examples of meso-level green transitions include transitioning to sustainable energy production, carbon capture projects, the application of sustainable farming and forestry methods, efforts to stop plastic pollution, the development of compact cities, expansion and electrification of public transport, and the promotion of low-carbon circular economy.

Without neglecting the crucial role of government regulation and market dynamics for generating green transitions, much research suggests that they can be fostered through collaborative governance, bringing public and private stakeholders together to define problems and design and implement joint solutions [4–6]. In particular, green transitions may be fostered through processes of collaborative innovation [7] or co-creation [8]. This insight is embodied in Goal 17 of the United Nations' Sustainable Development goals

(SDGs), which stipulates that the first 16 SDGs must be achieved through public–private networks and partnerships.

Co-creation is a sub-set of collaborative governance involving government officials, scientists, private stakeholders, and lay actors (e.g., citizens, neighborhoods, community organizations) in distributed action that facilitates the exchange and pooling of experiences, ideas, and resources, while also stimulating mutual learning and bottom-up innovation [9]. Whereas collaborative governance focuses on the inclusion of organizational actors, and aims at fostering socio-political alignment, which is often orchestrated by state actors, co-creation makes a point of involving lay actors, aims at fostering innovative solutions, and it has a more distributed leadership. Co-creation must not be confused with co-production, which merely seeks to mobilize the competences of service providers and users in the production of predefined solutions. In co-creation, participating actors engage in creative problem-solving that mobilizes actor-specific assets (e.g., knowledge, expertise, authority, creativity, and finance) to forge and promote needs-based solutions that enjoy widespread support. The leverage of actors across organizational and sectoral boundaries enables them to create solutions that they would have been unable to produce single-handedly [10], and by flexibly mobilizing societal resources, the involved actors may foster governance robustness in the face of varying levels of state capacity [11].

Co-creation is a powerful tool for enhancing environmental sustainability [6,12]. It not only mobilizes culturally diverse forms of knowledge, competences, and resources in creative problem-solving that spurs the development of innovative solutions, it also fosters a sense of joint ownership of the green solutions, which reduces the implementation resistance that is often considerable, as green transitions disrupt social habits, vested interests, landscapes, and production and consumption patterns. However, co-creation is not without its challenges: it does not emerge spontaneously when needed, may lack clear direction, can create significant transaction costs and conflict, and it often encounters institutional inertia. This paper aims to explore how these and other barriers to the local co-creation of green transitions can be overcome through metagovernance, which is defined as the more or less institutionalized practices that directly or indirectly influence the processes and outcomes of relatively self-governed processes of interaction between distributed actors [13].

While there is a burgeoning literature on collaborative and networked governance of green transitions [4–6], few researchers have bothered to explore the conditions of emergence for the co-creation of green transition [14] as seen in [15,16]. To compensate for this benign neglect, this theory-building article aims to bring together theories of sustainability transitions, collaborative, and networked governance to unravel the conditions required for local co-creation to emerge and produce green transitions. Our guiding question is: How can different structural, strategic, or tactical-operational governance factors prompt, support, and scaffold local efforts to co-create green transitions, and what constellations of these governance factors are likely to spur the co-creation of green transitions in different socio-political contexts? These key research questions are based on a constructive engagement with extant research literature. Rather than reviewing the literature, the purpose of this research is to harness key insights to construct a theoretical framework, allowing us to study contrasted paths to successful local green co-creation.

Research on green transitions has thus far been dominated by technical perspectives focusing on the invention, adoption, and impact of green technologies [17,18]. We must strengthen social science research investigating how different forms of governance can facilitate the co-creation of socio-technical green solutions [5]. In an attempt at bridging different strands of relevant literature in the field of collaborative and networked governance, we provide an overview of governance factors conditioning the co-creation of green transitions. The resulting theoretical framework allows us to conjecture about the constellations of governance factors that will be critical in different socio-political regime contexts. Future attempts to operationalize the governance factors embedded in the contingency framework will facilitate empirical testing of these conjectures and help to identify factors that must

be strengthened to promote and sustain successful green co-creation projects. Structural governance factors may be more difficult to transform than strategic governance factors, which, in turn, may prove more resistant to change than tactical-operational factors. A better understanding of what supports or hinders the co-creation of green futures may help government officials to design and implement self-reflexive transformation strategies.

Our paper proceeds as follows. First, we introduce key concepts of sustainability transitions and co-creation and then present the theoretical underpinnings of the research on how to metagovern local co-creation projects for green transitions. Next, we identify 15 structural, strategic, and tactical-operational governance factors that may positively impact the local co-creation of green solutions. We then hypothesize different constellations of these factors that may be more efficacious in certain socio-political contexts. The conclusion calls for empirical analysis guided by the socio-political contingency framework in order to identify contrasted pathways to successful local green co-creation.

2. Theoretical Framing of the Governance of Co-Created Green Solutions

An extensive body of research on sustainability transitions recognizes the importance of collaboration [4–6]. Reciprocally, some collaborative governance research focuses on sustainability [19,20]. Combining these complementary insights, we assert that sustainability transitions may be produced through local co-creation processes that bring a diverse group of interdependent actors together to collaboratively design and implement sustainable solutions to environmental problems. Sustainability transitions are processes of profound change in how we do, think, and organize society and the economy that promote sustainable production, consumption, and living [21,22]. Sustainable transitions frequently involve social experimentation and innovation [23] that can be spurred by co-creation involving a distributed set of relevant and affected actors in creative problem-solving [24]. While there is strong evidence for the ability of co-creation to drive transitions to sustainability [4,5,8,16], scant attention has been paid to the governance factors that prompt, support, and scaffold local green co-creation.

Our attempt to tease out the governance factors supporting the co-creation of green solutions draws on four existing theoretical frameworks that together capture the variation in the “collaborative turn” public governance research [25]. First, the *Institutional Analysis and Development* (IAD) framework developed by Ostrom and Kiser [26] focuses on how collective action is influenced by biophysical conditions, community attributes, and institutional rules that shape how actors make choices and interact to produce environmental governance outcomes. To understand how collective action can protect common pool resources, Ostrom [27] identified eight design principles that communities must achieve to manage natural resources successfully including: the definitions of community boundaries must be clear, rules must fit local circumstances, participatory decision-making is crucial, compliance must be monitored, sanctions must be imposed, conflict mediation should be readily available, higher levels must accept local self-governance, and local networks must be embedded in larger networks. The IAD framework also highlights the importance of platforms and arenas and supportive forms of multi-level governance with interaction and congruence between rules at different levels [28].

Second, the *Network Management Framework* (NMF) developed by Kickert, Klijn, and Koppenjan [29] seeks to understand how interdependent actors form networks to exchange and pool their resources to solve complex problems. This perspective is particularly interested in understanding how network structuring and network management can improve how networks function, thereby optimizing their contribution to governing complex societies. Network structuring refers to the institutional designs that determine which actors are included in and excluded from the network, the arena in which they interact, the overall goals and tasks, and the ground rules conditioning their interaction. Network management refers to the exercise of facilitative leadership that frames and guides interactions, mediates conflicts, selectively activates key actors, and handles strategic complexities in order to improve performance and ensure transparency and accountability.

Third, the *Collaborative Governance Framework* (CGF) synthesized by Ansell and Gash [30] aims to understand how public agencies engage collaboratively with public and private stakeholders to enhance the legitimacy of public governance outcomes. The framework emphasizes the conditioning impact of antecedent conditions, such as government policies, the distribution of power and resources amongst relevant and affected actors, and the prehistory of conflict or cooperation. These factors feed into the collaborative process that is depicted as a social learning process in which actors engage in face-to-face dialogue and build trust, commitment, and shared understanding in an effort to reach some kind of consensus about problems and solutions.

Finally, the *Collaborative Regimes Framework* (CRF) articulated by Emerson, Nabatchi, and Balogh [31] expands the idea of collaborative governance beyond formal state-initiated arrangements to include community-based collaborations. They generalize antecedent conditions to a more encompassing “system context” for collaboration and specify different drivers of collaborative governance (convening power, incentives, interdependence, and uncertainty). Collaborative governance regimes have three interrelated collaborative dynamics: (1) principled engagement (learning-based deliberation and problem-solving), (2) shared motivation (trust, understanding, legitimacy, and commitment) and (3) capacities for joint action (leadership and institutional design) that produce collaborative outputs and outcomes. These features are adapted over time, potentially leading to a changing system context and new collaborative dynamics.

While not explicitly discussing “co-creation”, which is a new term in public governance research, the four governance frameworks all emphasize the role of collaborative interactions in public problem-solving, each offering their unique perspective on co-creation. Ostrom’s IAD discusses the role of pluricentric governance and recommends the participation of users and citizens in service production; the NMF explores the interaction between relevant and affected actors in governance networks; and the CGF and CRF focus on formal and/or informal collaboration in creative problem-solving. The four strands of literature also share an interest in how collaborative processes and outcomes are conditioned by social and political contexts, institutional structures, and forms of management. Through a close reading of the four strands of literature and related research stressing the role of co-creation [24,32,33], we have identified the key governance conditions supporting collaborative problem-solving including the following:

- The collective dynamics of community self-governance, which are important for understanding how local actors can come together to produce green transitions;
- Sensitivity to the interlinkages between local and higher-level governance institutions;
- Specification of the structural and institutional context and how it affects local interactions and the co-creation of desired outcomes;
- Appreciation for actor interdependence as both a precondition and a product of collaboration—and how it shapes the co-creation trajectory;
- The importance of institutional design and facilitative leadership for improving the functioning of collaborative arenas for co-creation;
- Attention to the dynamics of social learning both for improving collaboration and stimulating innovation;
- A broadening of the collaborative governance framework beyond its instrumental value for public agencies and beyond its narrow focus on organized stakeholders.

Building on and further substantiating these broadly formulated governance conditions, we have developed a comprehensive list of 15 distinct governance factors that we describe and discuss in the next section based on a reading of specialized literature with which we were either already acquainted with or discovered through a thematic literature search using standard search engines such as Google Scholar. The results of our literature studies are comprehensively discussed elsewhere [8]; for the sake of brevity, the presentation of the 15 governance factors in the next section merely extracts and distills the key insights.

3. Governance Factors Conditioning the Co-Creation of Green Transitions

Governance factors are conditions capable of affecting local co-creation processes and their—in this case—green outcomes by helping to overcome collective action problems, stimulate mutual learning, generate innovative yet feasible solutions, and secure broad-based support for their implementation. Depending on their relative presence or absence, governance factors may drive or hamper the co-creation of the green transitions. As highlighted by Ostrom [28], the conditions for collaborative problem-solving tend to interact with each other, thus calling for a configurational analysis. The governance factors may reinforce each other, creating synergistic effects, and some factors may combine to produce positive outcomes in the absence of other factors.

Three types of governance factors may be conducive to the co-creation of green transitions. First, *structural governance factors* are inherent to the wider social, economic, and political context in which co-creation processes unfold. They are typically perceived as a set of somewhat distant structural conditions that the local participants often take for granted because changing them in the short run is almost impossible due to their systemic character. Second, *strategic governance factors* are found in the immediate institutional environment of co-creation and refer to the strategic agendas that institutional actors develop in the medium term. These institutions and agendas are relatively stable but can be changed or directed through proactive efforts to support co-creation. Finally, *tactical and operational factors* are internal to the co-creation process and pertain to the exercise of collective or distributed leadership of ongoing co-creation processes. These governance factors can be changed in the short term via proactive learning triggered by emerging problems and opportunities.

For each type of governance factor—structural, strategic, and tactical/operational—we call attention to five specific factors likely to support the co-creation of green transitions. Future research may add more governance factors to the list presented below or choose to split some of them in two. However, the factors included here roughly match recent theoretical [8,15] and empirical studies [34,35]. Our discussion focuses on the mechanism through which the various governance factors impact the co-creation of green transitions.

3.1. Structural Governance Factors

3.1.1. Severity of Biosphere Conditions

The severity of biosphere conditions may play a critical role in prompting co-creation efforts. Biosphere conditions refer to real problems affecting the natural world (e.g., droughts, flooding, threats to biodiversity, soil erosion, water pollution) caused by a combination of climate change, geographical features, and human pressures on nature. While the IAD framework considers biosphere conditions as objective states of the natural world relating to atmospheric, terrestrial, and aquatic conditions [36,37], we stress the importance of how they are discursively constructed at the national and international levels. Hajer [38] famously points to the importance of “discourse coalitions” that shape and frame environmental problems in ways that may stimulate or suppress environmental action. The recognition, diagnosis, and framing of biosphere problems at the political regime level is critical for their ability to stimulate action.

Problems framed and perceived as severe and urgent in terms of causing health problems and/or disrupting social and economic life are more likely to receive public attention and support [39], and global and national agenda-setting will create windows of opportunity for local actors to explore prospects for collective action [40]. Local evidence of, or concrete experience with, the issues raised by global and national agendas provide impetus and incentives for local action [41,42]. While several studies demonstrate how the constructed severity of problems prompts local collaboration [43,44], less attention has been paid to how global and national problem framings impact local collaboration efforts. More attention must focus on whether and how actors involved in the local co-creation of green solutions are influenced by global and national biosphere problem framings and how local resonance with these framings motivates local actors to invest time and energy in co-creating green solutions.

3.1.2. Formal Legislation, Programs, and Goal-Setting

Policy agendas stressing the severity of biosphere problems may prompt local collaboration, but so does formal legislation, policy programs, and goal-setting that signal the commitment of higher-level political authorities (e.g., national governments, international organizations) to environmental action. These commitments may signal expectations that motivate local actors to act. A first issue is whether national governments officially commit to sustainability transitions. Such commitments may help establish the legitimacy of a green agenda at different levels of government. A second issue is whether national governments establish concrete goals and targets for pursuing and prioritizing sustainability objectives that may encourage local action and resource mobilization. A third issue is whether governments follow up on these commitments by establishing specific enabling laws and policy programs, which may authorize and incentivize local efforts and provide access to knowledge, expertise, and funding [45]. A final issue relates to government willingness to remove legal and regulatory barriers to green transitions advanced by local actors, as in the field of green energy production [46] and carbon capture and storage [47].

While formal legislation, policy programs, and goal-setting can support local co-creation, much depends on the character of these policy frameworks. While merely symbolic or tokenistic in some cases, their impact in others is limited due to unclear goals and definitions, a lack of adequate guidance, and insufficient support for local action [48]. National frameworks can also be out-of-sync with local agendas, capabilities, and priorities; and the absence of national support for international policy agendas, such as the Paris Agreement, sometimes stimulates local actors to fill the policy vacuum [49]. Still, international and national frameworks can play an agenda-setting role for local co-creation, creating legitimacy, encouragement, and critical resources [35]. We must therefore investigate whether and how formal legislation, programs, and goal-setting create fertile contexts for local co-creation.

3.1.3. Relative Openness of Public Governance Paradigms

Here, the focus is on the extent to which political-administrative structures promote and make room for local interactions between public and private actors by means of decentralizing political responsibilities and tasks to relatively resourceful local political-administrative institutions capable of orchestrating local co-creation processes. The key issue is whether the state structure and administrative apparatus create or inhibit opportunities for engaging with and empowering societal actors to co-create. Notably, different administrative traditions tend to produce different types of state–society relations [50], some more propitious for local co-creation than others.

The relative openness of the administrative state has also been discussed in terms of how different public governance paradigms support the devolution of public problem-solving to local governments and encourage them to involve societal partners from private markets or civil society [51]. Three broad paradigms are commonly identified:

Traditional Bureaucratic Administration is based on centralized control and relies on public managers and employees to deliver public services, regulate society and the economy, and solve pressing public problems based on their professional expertise [52]. These professionalized administrations are often, although not inevitably, relatively closed to societal input and influence, because they stress the importance of top-down command, uniform application of rules, and strict accountability protocols. Societal input is viewed skeptically as the entrée to clientelism or corruption.

New Public Management devolves administrative decision-making power to relatively autonomous and deregulated public agencies and service organizations, encourages competitive contracting, and seeks to hold agencies and contractors “accountable for results” [53,54]. However, aside from the involvement of private firms as contractors and individual users as customers in the new service markets, New Public Management does not seek to exploit this enhanced agency autonomy to initiate broad-based collaboration with local stakeholders [55].

New Public Governance goes a step further by not only devolving public tasks to local public organizations but also trying to connect these organizations with each other and with a broad range of local stakeholders through the formation of networks and partnerships [56,57]. In addition, attempts at adopting a more trust-based management style tend to create space for frontline staff to engage in collaborative problem-solving [58].

The contingent transition from centralized and insulated forms of traditional bureaucracy, via decentralized service production in new quasi-markets, to decentralized forms of collaborative governance in networks and partnerships, is likely to enhance the motivation of local public managers and local stakeholder organizations to initiate co-creation processes. New research suggests that co-creation may even emerge in public sectors dominated by Traditional Bureaucratic Administration or New Public Management [59]. Still, New Public Governance strategies are more likely to stimulate local efforts to involve civil society actors in the co-creation of green solutions [60]. We must study how the growing openness of recently developed public governance paradigms supports the involvement of societal actors in creative problem-solving.

3.1.4. Traditions of Citizen Participation and Community Mobilization

For historical reasons, civil society is more vigorous in some countries than others—and therefore more likely to support co-creation. Some countries have deep traditions regarding public participation and community mobilization that have a legal, institutional, organizational, and cultural basis. Some political regimes have legal frameworks that specify rights for citizens to organize and freely participate in policymaking, or even mandate citizen participation in consultatory planning processes, user boards, or local referendums. In some countries, the public sector actively promotes civic engagement by supporting voluntary organizations and offering meeting spaces free of charge in public libraries and community centers. A well-organized civil society that allows local communities, ethnic groups, businesses, and social classes to advance their collective interests plays a particularly important role in driving citizen participation. Finally, cultural norms may support citizen engagement in local action, building self-reinforcing local narratives about the value of participation. Putnam [61] and others have pointed out how this “social capital” serves as a resource for community mobilization.

Since co-creation involves lay actor participation, it tends to thrive where there are strong and vibrant participatory traditions rooted in an active and engaged civil society [62,63]. In some settings, participation obviously takes the form of clientelistic mobilization that benefits narrow groups. Such mobilization can block efforts to engage a broad spectrum of civil society actors in the production of innovative public value outcomes. Community-based mobilization that bridges groups can partially counter these problems. Such mobilization is often supported by NGOs with an agenda to promote more general societal goals or broad-based participation [64]. In sum, we need to analyze how legal, institutional, organizational, and cultural traditions pertaining to citizen participation and community mobilization support green co-creation.

3.1.5. Mechanisms for Ensuring Top-Down Government and Bottom-Up Social Accountability

Systematic attempts at ensuring that the social actors engaged in public governance are accountable for their performance, results, and outcomes may keep them on their toes and ensure that they do their best to use their resources and competences to produce effective, efficient, and fair solutions. Accountability mechanisms not only force governance actors to anticipate the wants, demands, and expectations of the actors they serve but may also encourage learning based on critical feedback and enhanced transparency [65].

Ensuring the accountability of co-creation arenas hinges on the provision of accessible and non-technical information to particular accountability audiences that can scrutinize, pass judgment, and sanction the performance and results of the co-creation process [66]. Co-creation arenas may be subjected to a combination of upward and downward accountability. Upward accountability to public authorities and sponsors is particularly important if the

co-creation relies on financial, political, and moral support from powerful public and private actors. Downward accountability flows from a co-creation partnership to those actors affected by its interventions. Critical feedback from local citizens and stakeholders is crucial for achieving accountable co-creation outcomes.

So-called “social accountability” may provide a downward accountability mechanism to compensate for problems associated with upward accountability to higher-level public authorities [67–70]. Social accountability aims to improve performance and results by empowering service users, affected citizens, NGOs, private business, local media, etc. It aims to facilitate dialogue between the account-givers and the local accountability audience based on accessible non-technical accounts of processes and outcomes, and to ensure that the actors involved in co-creation respond to criticisms and justify their actions. For social accountability to be effective, Fox [69] observes that weak and vulnerable groups should be given a voice in facilitated dialogues, critical assessment must not be constrained by fear of reprisal, and negative and positive sanctions must be used to elicit responsiveness. Most importantly, the local sanctioning of unfair processes and negative results must be reinforced by upward accountability. In sum, we must explore whether and how downward and upward accountability can be combined to enhance the effectiveness, legitimacy, and fairness of local co-creation.

3.2. Strategic Governance Factors

3.2.1. Strategic Agenda-Setting by Means of Translation

Local governments, stakeholders, and citizens might not view the global and national agendas as important and productive unless they are properly “translated” [71]. The message from translation theory is that agenda diffusion depends on strategic efforts to translate global or national agendas in a manner that renders them relevant and meaningful to local actors [72]. To elicit broad-based interest and support, global and national agendas like the UN SDGs must be framed as necessary and appealing opportunities that speak to the tacit, practical, and situated knowledge and perceptions of local actors. Translation work cannot be done at an arms-length from the local context; it requires knowledge of what is at stake for public and private actors, information on projects and initiatives already underway, and insight into how local actors make sense of related issues. Translation work must invest time and energy in getting to know the local community.

Ideally, the translation of global and national agendas should speak to and potentially mobilize different local audiences to facilitate collaboration. Storylines with a high degree of multivocality may successfully exploit lexical ambiguity to rally actors with different views and interests around a common course of action [73]. To sustain collaborative efforts, translation work must appeal to and mobilize boundary spanners who bring together and align different local agendas, interests, and actors [74]. Understanding this translation process requires further investigation of who is doing the translation work, what discursive strategies they deploy, and, most importantly, how local translation work aligns public, private, and civic actors.

3.2.2. Invoking Collective Narratives about Successful Collaborative Problem-Solving

While actors from the public sector, the market economy, and civil society may sympathize with the green agenda, their decision to participate in problem-focused co-creation activities is sensitive to time constraints, other pressing commitments, and fears that collaboration will be too demanding, troublesome, or unproductive. Local actors’ worries regarding the feasibility and efficacy of collaborative problem-solving may prevent the initiation of co-creation. Invoking local narratives about successful past collaboration may help to convince local actors that co-creation is an exciting and rewarding endeavor that will bring about much-needed change.

Positive community attributes can predispose local actors to contribute to collective problem-solving [75]. Positive prior experiences with collaboration that has overcome conflicts and produced effective governance solutions will tend to enhance faith in the

efficacy of future collaborations [30]. An accumulation of stories about successful collaboration may build a positive reputation for collaborative governance that will help local actors overcome their worries and invest in joint attempts to solve pressing local problems. Emerson, Nabatchi, and Balogh [31] confirm that repeated interactions based on principled engagement, help to foster the trust, mutual understanding, internal legitimacy, and shared commitment crucial for generating and sustaining collaborative problem-solving. Local leaders may invoke positive co-creation experiences to build and sustain new collaborative projects.

Successful collaboration narratives may contribute to the robustness of co-creation should collaborative processes turn sour. However, the erosion of the perceived feasibility and efficacy of co-creation may eventually cause positive narratives to break down, especially if local community leaders are unable to draw positive lessons from occasional failures. Hence, the strength and longevity of local narratives of successful collaboration depend on the ability of local leaders to feed the narrative with new success stories and to portray occasional failures as exceptions that prove the rule. In sum, we need to explore the role of positive collective narratives for motivating actors to participate in and commit to collaborative endeavors.

3.2.3. Building or Harnessing Institutional Platforms and Arenas

Institutional platforms and arenas that foster collective action, collaboration, and political intermediation at the community level can enhance the prospects for the successful co-creation of green solutions [76]. Platforms are relatively permanent institutional frameworks that scaffold collaboration by helping local actors to organize, interact, and innovate. They often do so by creating ad hoc arenas in which people can easily discuss, debate, brainstorm, and create together. Digital platforms may facilitate coordination and exchange between widely distributed actors, but they may also be organizational or physical structures that allow local stakeholders to meet, interact, and collaborate [77]. The concept of arenas—defined as spaces for participation, communication, and joint action—developed out of a concern for enhancing deliberative democracy and enhancing face-to-face or digitally-mediated collective action, conflict management, and creative problem-solving [78,79]. Platforms may be public, private, or hybrid institutions, and they may support the formation, adaptation, and multiplication of arenas.

Platforms provide infrastructural support for co-creation efforts, often by providing reusable resources such as access to expert knowledge or practical advice, organizational templates, or modes of communication. This support encourages high-quality interaction and provides generative tools that allow actors to brainstorm together, develop and test prototypes, and conduct experiments. While a significant body of research has developed around specific types of platforms (e.g., urban living labs, agricultural innovation platforms, policy sandboxes, and citizen deliberation platforms), platforms for fostering co-creation for sustainability are less studied [80,81]. Hence, we must investigate whether and how platforms can enhance co-creation for sustainability by providing infrastructural support for the formation of arenas that facilitate collaborative innovation [82].

3.2.4. Providing Access to Blended Financing

While the initial exploratory stage of co-creation is generally inexpensive, the later stage of solution testing, implementation, and scaling can be costly. While the participants themselves will fortunately cover some of the pecuniary and non-pecuniary costs, a persistent need remains for the funding and financing of green co-creation; indeed, more funding and improved financing are key to achieving the SDGs [83].

The funding of the initial, explorative process of co-creation projects tends to draw on the participants' resources, although the availability of "seed money" to cover the formation of steering groups, the convening of meetings, and information retrieval is often a key to success. When it comes to financing the testing, revision, and scaling of co-created solutions, the problem is that the amount of money needed to finance green transitions

tends to exceed the financial capacity of local, regional, and national states, particularly in poorer countries. The solution to this problem is often to provide some kind of “blended financing” combining multiple resource streams from public budgets, international donor organizations, private philanthropies, crowd funding, user tariffs, product certification, private investment, and loans from green development or commercial banks [84,85]. While blended financing emerged to address financial challenges in the global south, it has wider applications, since green transition projects may fail to attract sufficient private financing due to the risks and uncertainties related to their future returns. Through the provision of basic investments, grants, guarantees, equity, low interest loans, capped return schemes, etc., blended financing solves this problem by strategically using public funds and special-purpose funding to improve the risk-and-return profile of investments [86].

While economically viable green infrastructure projects will be the most amenable to blended finance, projects that do not produce a return on investment may encounter more significant challenges. The basic idea of blended finance might still be relevant, however, since public financing and special purpose financing will often be able to mobilize monetary or in-kind contributions from a broad range of public and private actors. Hence, we need to explore how the access to blended financing helps spur the achievement of co-created green transition projects.

3.2.5. Cultivation of Upward Linkages to Government at Multiple Levels

Rules, regulations, and policy programs originating at different levels of government condition the success of local green co-creation, and the propensity for success will increase when these conditioning factors play an enabling (rather than constraining) role [87]. Some governments eagerly remove red tape that makes it difficult to form green innovation partnerships; others fail to do so. Governance studies suggest that failure is more likely when a traditional state-centric understanding of governance dominates [11] but that the cultivation of upward linkages with government actors and continuous dialogue across levels can facilitate local green co-creation [88]. Dialogue helps governments to be more supportive of local sustainability partnerships, but it can also create opportunities for local actors to better understand government agendas, access valuable resources, and locate the support they need. Such dialogue can also build trust and mutual respect between government and civil society [89]. Hence, the benefits of dialogue flow in both directions: from government to local actors and from local actors back to government.

Close and continuous dialogue between national governments and local actors involved in co-creation tends to be rare due to institutional boundaries and decoupled problem-solving. Promoting such dialogue calls for persistent and targeted efforts to enhance intermediation and conversation between national, regional, and local governments and local co-creation arenas [90–92]. As such, we must study how dialogical intermediation takes place and contributes to enabling local action and green transition.

3.3. Tactical and Operational Governance Factors

3.3.1. Inclusion and Empowerment of Relevant and Affected Actors

Co-creation thrives on inclusion, but the transaction costs of collaborating and the risk of conflict and stalemate tend to increase with the number of participants. Still, within limits, co-creation should aim to bring together a broad range of relevant and affected actors to make use of their different experiences, perspectives, ideas, and resources [31]. Harnessing the cultural, cognitive, and operative differences between public, private, and third-sector actors, including users, citizens, and community groups, presupposes that these actors can all participate fully and effectively.

In reality, this presupposition does not always hold, as key social, political, and economic resources are unevenly distributed across the participating actors who may also have different experiences with participation and face different biases, including prejudice. To give all actors a fair chance of being heard and to influence joint decisions, the conveners of local co-creation processes must empower weaker actors while reminding the stronger

ones that their actions may marginalize or intimidate other participants. Indeed, the co-creation participants must all be empowered to ensure that they understand the problem at hand, the conditions for solving it, and the basic features of the potential solutions. Collective empowerment will also enable the local coalition of actors to stand up to strong external interests working to obstruct green transition [93] and to counter the types of mis- and disinformation frequently used to undermine green transitions [94].

Empowerment is defined as capacity-building actions, interventions, and conditions that enable individual actors or groups to influence the process and outcome via joint action [95]. Group-level empowerment may start by providing information about the possibilities for becoming actively involved in co-creation [96]. Pre-meetings with weak, vulnerable, or inexperienced participants can help bring them up to speed and inform them about involvement opportunities. Other empowerment strategies include the mentoring of weaker actors, selective activation of their skills and knowledge, and the facilitation of meetings to allow everybody to speak up. To level the playing field, conveners may also facilitate information-sharing early in a co-creation process. Finally, leadership tasks can be distributed to empower participants by breaking down the leader-led distinction [97]. We must examine whether and how leaders empower some and/or all of the participants in local co-creation processes to see if doing so helps to harness the manifold experiences, ideas, competences, and resources that they bring to the table.

3.3.2. Clarification of Interdependence vis-à-vis Common Problems and Joint Visions

Although local actors may sometimes collaborate out of a sheer desire to do something meaningful together or because traditions or habits dictate doing so, their readiness to stick together in the face of disagreements, troubles, and the rising cost of participation is greater when they share a sense of resource interdependence. Perceived interdependence will encourage actors to seek out additional leverage and collaborative advantage [10]. Hence, co-creation develops when actors recognize how the achievement of their goals and aspirations depends on the know-how, resources, connections, ideas, and commitment of other actors.

Interdependence may sometimes emerge spontaneously when it becomes clear that individual goals can only be achieved through joint effort. However, interdependence can also be revealed through leadership interventions that foster mutual dependence vis-à-vis a particular set of goals. Theories of metagovernance stress the important role of strategic leadership for clarifying, strengthening, and creating interdependence in ways that spur collaboration [98]. Clarifying interdependencies involves pitching the need to solve a pressing problem to a group of relevant and affected actors and asking them to map their respective resources and competences. Strengthening interdependencies involves the creation of a “community of destiny” that clarifies for everyone how they can only rise and conquer if everyone commits to the process. Finally, creating interdependencies involves rewarding collaborative problem-solving by making the formation of a partnership based on resource exchange a condition for receiving public funding, or by making the formal political approval of co-created solutions dependent on the active contribution and support of all of the relevant and affected actors. We must study the perceived interdependence between actors participating in co-creation processes to analyze how leaders clarify, strengthen, and create interdependencies to build momentum for green co-creation.

3.3.3. Trust-Building and Conflict Mediation

Beyond empowerment and interdependence, there is an ever-present risk of the involved actors being reluctant to collaborate with each other due to a lack of trust or the presence of conflicts [8]. To remove or mitigate such risk, facilitators must build trust, defined as the positive but uncertain expectation that other actors will refrain from exploiting a given situation to seek individual benefit [99]. Facilitators must both build interpersonal trust between participants and institutional trust in the fairness and efficiency

of the collaborative process [100]. The former can be achieved by spurring social interaction that allows participants to get to know each other, understand their various reasons for participating, and learn that other participants are prepared to collaborate, share their knowledge and resources, and respect the outcomes of joint deliberation. The latter can be achieved by involving the participants in defining the set of rules, norms, and procedures guiding the collaboration.

Trust is essential for creating sustained collaboration, but conflicts may arise even in relatively trust-based forms of collaborative engagement. Some conflicts may be productive, forcing participants to clarify, nuance, and amend their views and arguments. Others are destructive, leading to stalemate and eroding the trust between participants. Destructive conflicts may ultimately undermine the co-creation process and should be mitigated through proactive forms of conflict mediation aimed at turning antagonistic conflicts—where the conflicting parties view each other as “enemies” to be defeated—into agonistic conflicts between “adversaries” competing for influence but working toward a common objective. The final goal of conflict mediation is to foster accommodation, compromise, or agreement between the conflicting actors [101]. In their effort to arbitrate conflict and maintain a certain level of trust, the conveners and facilitators of co-creation become mediators seeking constructive ways of managing differences, so that the participants can learn from each other and create new and effective solutions that transcend their own limited vision of what is possible [102]. In sum, we must study how preemptive conflict management through trust-building and proactive conflict management through intermediation can help to spur the co-creation of green solutions.

3.3.4. Use of Experimental Tools for Innovation

Green transitions require innovation in technology, consumption, production, policy, and ultimately, thought. Co-creation projects can innovate by engaging in various types of experimentation that allow participants to explore alternative strategies for achieving sustainability [23]. Experimentation assumes many different forms; from technical “laboratory experiments” conducted in highly controlled and artificial conditions to “real world” pilot projects that evaluate new, full-scale strategies in the field [103]. Experiments can be “socio-technical” in nature and focused on finding and testing more sustainable technologies, or they can be more social or political in nature and focused on developing more sustainable social behaviors, improved public policies, or new strategies of governance [23]. To conduct such experiments, co-creation projects often require specific types of technical and administrative capacity together with social and political authorization and support. The leaders of co-creation projects play a key role in building capacities and securing support for local experimentation.

While experimental innovation is often an output or outcome of co-creation, the co-creation process itself can be viewed as experimental. It is typically open-ended, emergent, and uncertain, and often feels experimental to its participants; qualities that have been conceptualized as a design process [104]. At least two design tools can help to render co-creation processes more innovative: user-centered design and prototyping. The former stresses the importance of accessing the knowledge and perspectives of those who will ultimately use the product, policy, or institution. Doing so often entails engaging a broader set of relevant and affected actors. The latter innovation tool, prototyping, is a process of iteratively improving a design based on continuous user feedback. Prototypes are approximations of possible solutions (mock-ups) with various levels of realism. Co-creation processes can begin with relatively crude, easily accomplished approximations, which can be developed and refined by moving toward more sophisticated and complete designs. User-centered design and prototyping capture the emergent, creative, and uncertain nature of collective innovation. Hence, we must investigate how these and other design tools facilitate experimentation that supports the development of innovative green solutions.

3.3.5. Ongoing Critical Self-Reflection and Learning

Co-creation projects must find ways of reflecting on their progress and evaluating their achievements so that they can break through stalemates, adapt their strategies, and refine their goals. Policies, programs, and projects traditionally do so through various well-known monitoring and evaluation strategies. Co-creation, however, presents several challenges to typical evaluation practices that assume preset goals, well-articulated theories of change, and clear timeframes for carrying out well-planned activities and achieving specific results. By contrast, co-creation processes have an emergent character, in which preliminary goals are often fluid, strategies of change develop only progressively, and timeframes, plans, and results are unclear from the outset. While the importance of learning and self-reflection are accentuated in such emergent situations, the mid-course and final evaluations of results and achievements based on the goals, strategies, and measures set out at the beginning of the co-creation are often less useful. It is therefore critical to appreciate how green transition projects can build learning and collective reflection into the co-creation process in ways that permit real-time adaptation as goals, strategies, and results evolve.

While traditional modes of evaluation may remain relevant for co-creation projects, several approaches to evaluation may particularly contribute to their specific needs for self-reflection and learning. One such approach is “process evaluation”, which seeks to evaluate the ongoing quality of collaboration in order to garner feedback toward improving collaboration in a timely fashion. Another approach to evaluation that mirrors the emergent nature of co-creation is “developmental evaluation” [105], which introduces critical diagnostic questions into the co-creation process that may encourage participants to address basic assumptions and to collect information enabling them to judge whether their current understandings and objectives are aligned. While co-creation projects may not explicitly adopt “process evaluation” or “developmental evaluation”, building sufficient self-reflection and learning opportunities into the co-creation process is critical. Continuous critical review of working assumptions, timely evaluation of these assumptions, and mid-course corrections are essential for effective co-creation.

4. Hypothetical Identification of Different Constellations of Governance Factors in Socio-Political Contexts

To further advance the analysis of the conditions of emergence of local green co-creation, we explored the relative importance of the governance factors in different socio-political contexts to prepare the way for future empirical research. Following Ostrom [28], we advocated for a configurational approach sensitive to how different factors contingently interact to jointly affect outcomes. A configurational approach is valuable for investigating how different constellations of governance factors may support local green co-creation.

Qualitative comparative analysis (QCA) is specifically designed for the configurational analysis of medium-sized batches of case studies (typically 20–50 cases) [106]. Using Boolean algebra and set theory, it helps to identify constellations of necessary and sufficient conditions associated with a particular outcome [107]. QCA assumes interconnections between conditions to explore the combined effect of the selected causal conditions on outcomes, which sheds light on complex causality due to conjunctural causation (conditions combined to produce an outcome), equifinality (more than one path to a given outcome), and asymmetry (the same outcome produced by the presence/absence of a certain condition) [108]. While regression analysis establishes causal connections between the outcome and one variable at a time, QCA analyzes the associations between combinations of conditions and the outcome, which makes envisaging the impact of contextual variation easier [109].

Much can be learned from using QCA inductively to explore the impact of the combined effect of a large number of factors on a particular outcome. However, it is also valuable to conduct the QCA in a more hypothetical and theory-driven fashion by exploring whether, in particular socio-political contexts, certain constellations of factors are likely to be associated with a desired outcome. Toward this end, we created three hypothetical

scenarios that differ in terms of who initiates and orchestrates the local co-creation of green transitions: (1) Are state actors at different levels taking the lead in spurring green co-creation (see [110])?; (2) Are green grassroots organizations and mission-driven NGOs the main instigators of local community action (see [64])?; or (3) Is green co-creation prompted and nurtured by an in-between layer of more or less professional entrepreneurs from private corporations, international donor organizations, or social foundations (see [111])? The underlying assumption is that different socio-political contexts will favor different public, civic, or private metagovernors, thereby creating different pathways to co-create green outcomes.

The first hypothetical scenario emphasizes *state-initiated co-creation* based on the formation of public–private partnerships that allow state actors to mobilize support and resources from social and economic actors in the pursuit of innovative solutions. While the state might be able to achieve much on its own, it may realize that co-creation stimulates creativity, mobilizes resources, and builds broad ownership for green transitions. State-initiated co-creation is typically found in the countries of northwestern Europe (e.g., the Scandinavian countries and the Netherlands), which have a strong interventionist state that mobilizes the resources of capable and well-organized actors from the economy and civil society. Public actors may play a leading role in the co-creation process, but they often seek to distribute leadership tasks among the participants to ensure buy-in.

The second hypothetical perspective emphasizes *entrepreneur-driven co-creation*, where well-trained, skillful, and professional entrepreneurs from private corporations, international donor organizations, or social foundations use their enthusiasm, insights, and networking skills to broker and bridge diverse social and political groups while occasionally also involving public actors. Entrepreneur-driven co-creation is typically found in Anglophone countries, such as the USA, which have a liberal state with relatively strong capacities, coupled with weak traditions of state intervention, and a strong entrepreneurial culture in civil society and the economy.

The third scenario emphasizes *grassroots-based co-creation*, where local activists and community leaders mobilize neighborhoods, communities of faith, ethnic groups, or women, appealing to their social hopes and indignation to fuel the development of bottom-up initiatives, which may oppose central government elites or selectively ally with progressive civil servants and local politicians. Grassroots-based co-creation is typically found in developing or newly industrialized countries, such as Brazil and South Africa, where the central state has green ambitions but may lack governance capacity. In such cases, local grassroots organizations and community mobilizations, in alliance with progressive local politicians and administrators, often play a progressive role in bringing a broad range of committed actors together to spur sustainable development.

These hypothetical scenarios can of course be further elaborated for specific countries or regions; however, the three conjectures capture some commonly observed archetypes. While they are developed with particular types of countries in mind, the actual strategies for spurring the co-creation of green outcomes may vary across localities. Empirical studies exploring the prevalence of the three hypothetical scenarios across a wide spectrum of cases from all parts of the world will help to determine their general validity.

The three hypothetical scenarios tend to be supported by different sets of governance factors. Table 1 provides an overview of the hypothesized importance (scored low, medium, high) of the 15 governance factors associated with each of the three theories. Since there is no theory determining the relative importance of the governance factors in the three hypothetical scenarios, we drew on our empirical knowledge from a large global research project to individually and independently score the governance factors in relation to the three types of socio-political regimes before finally comparing, discussing, and eventually agreeing on the scores, which remain hypothetical.

Table 1. The relative importance of the 15 governance factors for the 3 theories.

| | Governance Factors | State-Initiated Co-Creation | Entrepreneur-Driven Co-Creation | Grassroot Co-Creation |
|-----|---------------------------------------------------------------------------------|------------------------------------|----------------------------------------|------------------------------|
| 1. | Severity of biosphere conditions | High | Medium | Medium |
| 2. | Formal legislation, programs, and goal-setting | High | Medium | Low |
| 3. | Relative openness of public governance paradigms | High | Medium | Low |
| 4. | Traditions of citizen participation and community mobilization | Low | Medium | High |
| 5. | Mechanisms for ensuring top-down government and bottom-up social accountability | Medium | High | Medium |
| 6. | Strategic agenda-setting by means of translation | Medium | High | High |
| 7. | Invoking collective narratives about successful collaborative problem-solving | Low | High | High |
| 8. | Building and harnessing institutional platforms and arenas | High | Medium | Medium |
| 9. | Provision of access to blended financing | Medium | High | High |
| 10. | Cultivation of upward linkages to government at multiple levels | Low | Medium | High |
| 11. | Inclusion and empowerment of relevant and affected actors | High | Medium | Medium |
| 12. | Clarification of interdependence vis-à-vis common problems and joint visions | High | High | Medium |
| 13. | Trust-building and conflict mediation | Medium | Medium | Low |
| 14. | Use of experimental tools for innovation | Medium | High | Medium |
| 15. | Ongoing critical self-reflection and learning | Medium | Medium | High |

By highlighting the prominent governance factors associated with state-initiated, entrepreneur-driven, and grassroots co-creation, Table 1 provides some expectations for conducting a configurational analysis. Specifically, we anticipate that these three hypothetical scenarios for the co-creation of green transitions might depend on different sets of factors for producing success, which we shall briefly elaborate on to demonstrate their verisimilitude.

In the strategy for *state-initiated co-creation*, the following six governance factors are assumed to have a high impact on the successful co-creation of green solutions:

1. Severity of biosphere conditions;
2. Formal legislation, programs, and goal-setting;
3. Relative openness of public governance paradigms;
4. Building and harnessing institutional platforms and arenas;
5. Inclusion and empowerment of relevant and affected actors;
6. Clarification of interdependence vis-à-vis common problems and joint visions.

Capable governments will eventually put severe biosphere conditions on the political agenda and pass relevant legislation with clear goals that are supported by policy programs. These factors will help pave the way for a significant government investment in fostering sustainable solutions. The openness of public administration to organized stakeholders and lay actors, such as citizens, neighborhoods, and civil society organizations, will be decisive for spurring the co-creation of committed governments. The involvement of societal actors may be facilitated by the availability of platforms and arenas that foster collaborative innovation and help actors to appreciate their mutual resource interdependence.

The strategy for *entrepreneur-driven co-creation* assumes that the following six governance factors have a high impact:

1. Mechanisms for ensuring top-down government and bottom-up social accountability;
2. Strategic agenda-setting by means of translation;
3. Invoking collective narratives about successful collaborative problem-solving;
4. Provision of access to blended financing;
5. Clarification of interdependence vis-à-vis common problems and joint visions;
6. Use of experimental tools for innovation.

A sandwich strategy ensuring accountability is important when different private organizations and interest groups join forces to foster green transition. The group of collaborating actors may be more concerned with their own ideas and interests than with the needs of the local community, and this group must be held accountable for its activities. Joint action may be spurred by strategic agenda-setting aimed at translating overall societal goals to a specific context and locality in order to simultaneously build legitimacy and ownership for a particular set of goals. The construction of stories about successful past multi-actor collaborations is essential for demonstrating the feasibility and the likely impact of collaborative action for the green transition. Moreover, clarification of the potential contributions of each of the participating actors will further spur the co-creation of green results. Actors with different experiences, ideas, and interests must be convinced of the value gained from investing time and resources in collaboration. The risk of tunnel vision or the fear of innovation failure may deter collaboration. Experimental innovation tools may help to overcome this problem as they spur fast learning based on feedback and encourage partners to “fail small”.

Finally, in the strategy for *grassroots co-creation*, the following six factors are assumed to have a high impact:

1. Traditions of citizen participation and community mobilization;
2. Strategic agenda-setting by means of translation;
3. Invoking collective narratives about successful collaborative problem-solving;
4. Provision of access to blended financing;
5. Cultivation of upward linkages to government at multiple levels;
6. Ongoing critical self-reflection and learning.

In this case, visible local problems may have a greater chance of prompting collaboration between local actors and of drawing in public actors motivated to translate higher-level government goals into local action. Traditions of citizen participation and community mobilization may support grassroots initiatives, reinforcing the belief that collaboration is feasible and rewarding. Telling and re-telling stories about positive past experiences will further encourage participation and collaboration. Grassroots collaboration may encounter unforeseen hindrances but leveraging support by connecting with relevant government actors can help to manage the barriers created by national legislation or regulation. Co-creation process and outcomes will also be enhanced if participating actors constantly ask self-critical questions about whether they have understood the problem or challenge correctly, whether they have found the right solution, or whether they have sufficient data to evaluate results. Finally, since grassroots actors often lack resources beyond their strong commitment and energy, the co-creation of green solutions will be strengthened by access to blended financing.

The plausibility of the above narrative accounts for how different governance factors may interact, complement, and reinforce each other to produce successful outcomes within each of the three hypothetical scenarios; this is the only way to legitimize and motivate the testing of a particular constellation of factors in configurational analysis based QCA or other similar techniques. Should a certain combination of governance factors fail to provide an effective path to co-creation sustainability transition, one or more factors may be replaced. Fortunately, the QCA software makes it easy to do so.

5. Conclusions

This article examined how different structural, strategic, and tactical-operational governance factors can prompt, support, and scaffold local efforts to co-create sustainability transitions, and it has provided a comprehensive list of 15 such factors that may combine in different ways to produce green outcomes. It also examined which constellations of these governance factors are likely to spur the co-creation of green transitions in different socio-political contexts and has produced hypothetical scenarios combining different sets of governance factors; these scenarios are likely to be conducive for green co-creation in different socio-political regimes and are ready for empirical testing based on configurational methods such as QCA.

Instead of comparing the co-creation of green transitions with alternative governance mechanisms, such as top-down government imposition or market-led strategies, we have focused on what drives successful co-creation. Hence, we cannot conclude that co-creation is the best strategy for promoting green transitions, but we have developed a new theoretical contingency framework that allows us to identify different sets of governance factors that are likely to jointly stimulate the co-creation of green solutions, in particular socio-political contexts found in different parts of the world.

The theoretical framework and the three context-sensitive hypothetical scenarios described above will help to facilitate empirical studies of how different constellations of governance factors impact the co-creation of green solutions. To generate valuable comparative insights, such studies must have a global reach, thus requiring collaboration between research teams from all parts of the world. Our ultimate ambition of future research in this field is to identify the co-creational DNA of sustainability transitions in terms of the contingent pathways to mobilizing local knowledge, ideas, and resources in the co-creation of green solutions capable of halting and reversing the destruction of natural habitats and human living conditions.

Identifying alternative governance pathways to the successful co-creation of green transitions in different countries, regions, and socio-political contexts may enable researchers to refine theories of collaborative governance and co-creation by better understanding the conditions of emergence of collaborative problem-solving. The focus on the “conditions of emergence” of social and political interaction opens new avenues for research on “generative governance”. Generativity is derived from the notion of “genesis”, which refers to a primordial beginning. Zittrain [112] defines generativity as inputs (tools, strategies, frameworks, etc.) that may allow those using them to generate a wide range of novel, customized, and self-determined outputs. The study of “generativity” is a new and expanding field [113]. It has received growing attention in most scientific disciplines, except for the social sciences. This is regrettable, as “generative governance”, defined as the platforms, tools, strategies, etc. that facilitate collaborative interaction between distributed actors resulting in emergent forms of learning and innovation and joint action, holds the key to understanding the conditions of emergence for collaborative problem-solving and the co-creation of innovative solutions [9].

Our identification and explanation of the governance factors that may prompt, support, and scaffold the collaborative governance co-creation of sustainability transitions may not only refine and deepen academic research; but it may also have practical implications for public officials and intermediaries at multiple levels of governance. Our research may help them to consider which governance factors should be placed, or perhaps strengthened for

green co-creation to emerge and lead to green transitions. Our configurational approach may help practitioners to understand that governance factors are often most powerful when combined with other governance factors. However, precise recommendations as to which governance factors should be combined in different socio-political regimes will be deferred until our theoretical contingency framework has been translated into empirical research.

Author Contributions: Conceptualization, J.T., C.A. and E.S.; Writing—original draft, J.T., C.A. and E.S. All authors have read and agreed to the published version of the manuscript.

Funding: This work is funded by Danish Independent Research Fund, grant number is 1127-00034B.

Institutional Review Board Statement: Not applicable.

Informed Consent Statement: Not applicable.

Data Availability Statement: No new data were created or analyzed in this study.

Conflicts of Interest: The authors declare no conflict of interest.

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