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Markus Grillitsch, Jonathan Friedrich, Fredrik Nilsson, Sylvia Schwaag-Serger, Vitor Souza, Linda Stihl

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Markus Grillitsch[*1,2], Jonathan Friedrich[1,2], Fredrik Nilsson[1,3],
Sylvia Schwaag-Serger[1,4], Vitor Souza[1,3] & Linda Stihl[1,4]

Abstract:

The sustainability imperative calls for a sharp reduction in greenhouse gas emissions and virgin materials use. This requires the transformation of currently unsustainable global and linear value chains (GVCs) to regenerative and circular supply chains (CSCs). To deal with the complexities of such a shift, this paper suggests Arenas of Change as a theoretical perspective and methodological approach, capturing interaction spaces of actors who engage in changing how goods are produced, distributed and consumed, and how waste is recovered and reduced. Actors are conceptualised as being embedded in multi-scalar network, institutional and governance structures, which can enable or hinder change processes. We argue that the possibility of Arenas of Change to effectuate and accelerate shifts from GVCs towards CSCs depends on the realisation of synergies in four domains: i) business logics, models, and innovation; ii) consumption and user practices, iii) modes of governance, and iv) policies and discourses. Arenas of Change are thus a prism through which the interdependencies between domains, multiple scales and levels, and actors' strategies can be analysed. Thereby, Arenas of Change can contribute to theory-building about transformations from global and linear to regenerative and circular supply chains, and conditions that enable, accelerate or hinder such systemic change. Furthermore, by enhancing analytical leverage to comprehensively capture the complexity of such transformations, we propose Arenas of Change as an approach to design impactful interventions, and to evaluate their effects.

Keywords: Circular economy, global value chains, circular supply chains, business models, innovation, consumer practices, governance, innovation policy

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*corresponding author: markus.grillitsch@keg.lu.se
[1] CIRCLE – Centre for Innovation Research, Lund University
[2] Department of Human Geography, Social Science Faculty, Lund University
[3] Department of Design Sciences, Engineering Faculty, Lund University
[4] Department of Economic History, Lund University School of Economic and Management

1 Introduction

The idea of a Circular Economy (CE) is often articulated as a silver bullet to achieve sustainable material flows in the economy, which cut greenhouse gas emissions and virgin material use. The realisation of a CE beyond rather small-scale experiments requires an understanding of processes and mechanisms that make possible a shift from global value chains (GVCs) towards circular supply chains (CSCs). GVCs are central in today's globally integrated economy as they account for almost 50% of global trade, and are a mechanism for global integration, knowledge sharing, and prosperity (OECD, 2021; World Bank, 2020). However, GVCs have come under attack because they neglect environmental and social consequences. GVCs tend to create higher emissions and environmental harm than domestic value chains, due to the exploitation of weaker environmental regulations, and increased transportation need (Meng et al., 2018). This leads, for instance, to rich countries importing more than 30% of consumption-based emissions (Davis & Caldeira, 2010). As regards to the social impact, Bachelete (2022), UN High Commissioner for Human Rights, says "[t]he human rights impacts of global supply chains are clear: the use of precarious and informal employment is expanding at a rapid rate. Workers, especially migrant workers, are becoming ever more vulnerable, subject to a raft of human rights violations at the hands of their employers."

This means that for making progress on Sustainable Development Goals (SDGs) like poverty reduction, decent work and economic growth, reduced inequalities, and climate action, the fundamental characteristics of GVCs must be re-examined and challenged. A response broadly advocated in academic and policy discourses is the shift from a linear economy to a CE, which has become a powerful metaphor for a direction of change holding expectations to address multiple societal objectives from reduced environmental impact, vibrant regions, to secured supply chains. The CE is argued to stand in sharp contrast to the"make-sell-dispose" paradigm of traditional GVCs as it refers to an industrial system which is restorative and regenerative by intention and design (Ellen MacArthur Foundation, 2013). In essence, the CE advocates for closed loops of material flows to make the economy more sustainable. This is to be achieved with different so-called R-strategies extending from the recovery and recycling of materials to refuse, rethink and reduce, which are more ambitious strategies requiring a deeper change of consumption-distribution-production systems (Morseletto, 2020).

Yet, being a boundary object between research and practice, the notion of a CE carries a substantial degree of ambiguity (Kirchherr, Reike, & Hekkert, 2017). While intuitively powerful, the CE remains rather difficult to operationalise in the context of a globally integrated economy where countless flows of material and immaterial things at multiple scales are entangled and interwoven (Dicken, 2015). This complexity makes the CE difficult to operationalise and to engage with when fundamental shifts in GVCs are concerned. Who should engage with whom and how to make what change? And what consequences would such changes have for whom and where?

This paper contributes with a framework to investigate and develop actionable knowledge about these questions, useful in concrete contexts to make possible and accelerate shifts towards CSCs. We propose the notion of "Arenas of Change" to capture interaction spaces of actors who engage in changing how goods are produced, distributed and consumed, and how waste is recovered and reduced. Arenas of Change foreground sets of actors and their capabilities to make a change for more sustainable material flows. Actors are conceptualised as being embedded in multi-scalar network, institutional and governance structures, which can enable or hinder change processes. We argue that the possibility of Arenas of Change to effectuate and accelerate shifts

from GVCs towards CSCs depends on the realisation of synergies in four domains i) business logics, models, and innovation, ii) consumption and user practices, iii) modes of governance, and iv) policies and discourses.

First, a shift from GVCs to CSCs entails a shift from the dominant linear and transaction-based business logic to a logic of circularity and resource-maximization (Ripanti & Tjahjono, 2019). CSCs necessitate novel approaches, in particular the incorporation of broader restorative cycles at multiple stages gradually removed from the focal product (Batista et al., 2018), the incorporation of a broader range of material flows and networks, and the adoption of a wider systems perspective for supply chain practices (Nilsson, 2019). An integral aspect of CSCs is the creation of configurations that incorporate return flows for material recovery and restoration. This, in turn, means that the geographical dimension becomes essential to minimize unnecessary transports of global return flows. In a production and consumption system based on CE principles, recovery loops will be present at and between different levels, involving a variety of actors, and spanning multiple supply chains.

Second, a shift to CSCs challenges dominant (linear) consumption practices. In the linear architecture of GVCs consumers are seen as passive users of products and materials, often in places distant from the production of goods. A shift to CSCs may require changes to this perspective, asking consumers to become active agents of change, for example by participating in the design of circular products, the repair of used goods, or the use of circular business models such as rental options (Camacho-Otero, Boks, & Pettersen, 2018; Hobson, 2015; Jaeger-Erben, Frick, & Hipp, 2021). This involves changes in individual practices through the acceptance of certain products or technologies, and collective legitimacy for circular developments, leading to the collective adoption of innovations. All these aspects are also linked to the need for capacity building and specific knowledge among consumers to move from GVCs to CSCs. They also have geographical implications, such as the need for spatial integration of production and consumption to close material cycles, typically associated with shortening the distance between production and consumption.

Third, CSCs will require changes in modes of governance. The governance of GVCs involves a complex interplay between private and public sectors actors exercising power: firms, civil society, nation states, and international regulatory bodies (Gereffi, Humphrey, & Sturgeon, 2005; Kaplinsky & Morris, 2016). However, most GVCs share similar structures of having a few dominant firms, usually transnational corporations, who orchestrate the activities of other actors and exercise control over the supply chain's decisions and activities (Nilsson & Göransson, 2021). The choices of transnational corporations have traditionally been dominated by low cost and permissive regulative contexts (Silvestre, 2015). Hence, locating R&D, production, or resource sourcing in countries or regions offering most economic advantages has been a key driver for the competition between regions or countries. In contrast, CSCs are expected to involve a larger variety of actors, and local actors become more important as geographic proximity in recovery loops of CSCs will be more important than in the linear make-sell-dispose paradigm of GVCs. It offers a bottom-up alternative to reorganising value chains through local agency (Grillitsch & Sotarauta, 2020), as opposed to the top-down orchestrating of value chains through transnational corporations.

Forth, this also has policy implications at multiple levels. GVCs emerged because of a paradigm shift towards neoliberal globalisation in the 70s and 80s that promoted deregulation, low taxes, slim governments, and a dismantling of the welfare state (Grillitsch et al., 2024). This allowed for a global reach and integration of economic activities to unprecedented levels while largely

ignoring social or environmental consequences. In contrast, CSCs resonate with the changed context and objectives for innovation policy, calling for a redirection to promote not only growth but also environmental and social outcomes (Schot & Steinmueller, 2018). Shifting to CSCs as dominant practice calls for a change in the regulation of value chains so that greenhouse gas emissions, human rights, and inclusion are taken into consideration. However, the efforts by various actors to address societal challenges and strengthen sustainability are frequently not coordinated – neither across nor within governance dimensions (Grillitsch et al., 2019; Weber & Rohracher, 2012). Also, transformative policy initiatives are designed and studied typically with a particular territorial (e.g., regional, national, supranational) focus, largely ignoring how transformative initiatives and experiments by various actors are nested in multiple levels and scales, as well as their wider international repercussions (Borrás & Schwaag Serger, 2022).

After introducing the concept of Arenas of Change in the next section and discussing the four aforementioned domains in detail, we will situate Arenas of Change in a multi-scalar context. To this end, we build on literature about regional, national and global innovation systems, as well as socio-technical systems. We consider this suitable for situating Arenas of Change because the respective streams of literature provide theoretical and empirical insights into the conditions and processes enabling or hindering innovation and system transformation at different scales, and sectors. Going beyond describing the structural embedding of Arenas of Change, the purpose is to locate new actors and complementary knowledge and resources that Arenas of Change have linked up with (or have the potential to link up with) to break the lock-ins of existing GVCs and generate regenerative and sustainable CSCs. Arenas of Change, thereby, shed light on the forming of interaction spaces between old and new practices, and thus processes of (re)configuration and (de)institutionalization. As elaborated in the conclusions, this holds potential for gaining new theoretical and empirical insights, and for designing impactful interventions based on a comprehensive understanding of transformations that may lead from GVCs to CSCs.

2 The Concept of Arenas of Change

We suggest the notion of “Arenas of Change” as a prism to study, affect and accelerate the transformation from GVCs to CSCs. Arenas of Change capture concrete settings of actors who engage in changing the production, distribution, and consumptions of goods, as well as work on the recovery and minimisation of waste. Arenas of Change are the actors’ interaction spaces drawing attention to the possibilities, visions, imaginaries, and strategies for change individual and sets of actors have, conditioned by their relations with other actors and the institutional contexts they are embedded in. An Arena of Change will include different types of actors with different possibilities and powers to affect material flows. Lead firms in GVCs, typically transnational corporations, are powerful and can affect material flows in different locations. Policy actors at different levels have a direct influence in their jurisdictions but their actions might have indirect effects in other locations too. The practices of customers and users have an impact at the point of sale, the use, reuse and recycling of products, and might also affect distribution and production of the respective goods through the articulation of their demand. The focus on actor constellations makes it possible to study the distribution of power between actors, as well as the perception of power relations and responsibilities for a transformation towards CSCs by different actors and actor groups. The focus on Arenas of Change also enables the identification of shared or contested views and interests between actors, and consequently the articulation of a problem-solution nexus that may yield a more sustainable flow of material resources.

Arenas of Change can address different segments of GVCs focussing on the concrete interaction space where actors can affect material flows. For instance, Morgan (2025) embarks from the consumption side focussing on food in public institutions such as schools or prisons. Among other cases, Morgan studies the mission for school meals in the municipality of Malmö (Sweden), which pursued a long-term strategy to provide healthier organic food and reduce greenhouse gases. Organic food was initially not available in the region, so it was largely sourced over distance, and the greenhouse gas reduction was mainly due to a reduced consumption of meat. However, over time, local supply chains for organic food were developed, which contributed to a more sustainable flow of material resources. Grillitsch and Asheim (2023), in contrast, provide an example related to production in the maritime sector, where steel constructions are typically outsourced to low-cost countries. The authors showcase a firm strategy where automation technology was developed to make it possible to build steel constructions locally, sourcing green energy and in future (hopefully) green steel, cutting also long-haul transport and thereby greenhouse gas emissions substantially.

These two examples are quite powerful in showing real impact in terms of more sustainable material flows and reduced climate impact. Also, the examples show that focussing on a concrete setting, which typically only covers a particular segment of an existing GVC, does not imply that the change is incremental. In contrast, the two examples illustrate a deep change, which, in the first case, includes a change in consumption practices towards less meat, which usually is highly contested, and in the second case, entails the development of a complete new upstream supply chain, replacing previous suppliers. Hence, the transformation coincides with a change in actor constellations and networks (coupling and decoupling), and thereby in power relations and governance within value chains, as well as a qualitative change of existing actors, and the emergence of new actors (Friedrich et al., 2025).

As illustrated in Figure 1, we conceive Arenas of Change as interaction spaces of sets of actors engaging in a transformation from unsustainable GVCs towards sustainable CSCs. We argue that such transformation depends on the interplay of changes in four domains: i) business logics, models, and innovation; ii) consumption and user practices, iii) modes of governance, and iv) policies and discourses. Figure 1 depicts three circles, which indicate that the domains and thus relevant interaction spaces extend across scales (from local to global). Sets of actors and their networks are depicted with red dots and lines. The arrows indicate that a change in one domain will often call for or require a change in the other domains. The transformational power of Arenas of Change will then depend on the realisation of synergies between the four domains.

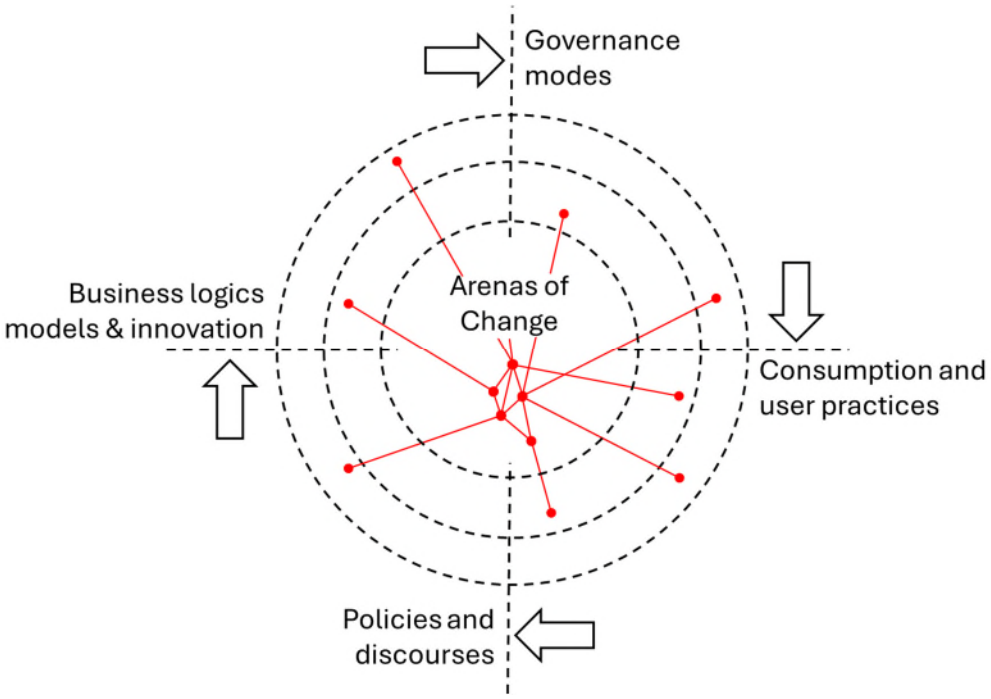

Figure 1: Illustration of Arenas of Change

2.1 Business logics, models, and innovation

Global value chains (GVCs) have traditionally been structured around economies of scale, high throughput, and linear consumption patterns. In such systems, business success is largely tied to the volume of products manufactured and sold, reinforcing models of overproduction and overconsumption (Gereffi, 2019; Tukker, 2015). This dynamic has contributed significantly to ecological overshoot, where global resource use exceeds the Earth's regenerative capacity (Wiedmann et al., 2020). The CE offers a systemic alternative to this logic, decoupling economic activity from material throughput. Rather than maximizing the number of units sold, CE emphasizes resource efficiency, product longevity, and closed-loop systems (Ellen MacArthur Foundation, 2013). However, embracing circularity in GVCs requires a fundamental shift in how value is created and captured, challenging the prevailing logic that more production equates to more profit (Ellen MacArthur, 2013; Hansen & Wiedemann, 2021; Lüdeke-Freund, Gold, & Bocken, 2019).

Circular business models challenge the persistent link between profitability and volume, emphasizing longevity, reparability, and shared use. New circular business models often incorporate a form of sustainable product-service systems (Gelbmann & Hammerl, 2015), where focus shifts from merely delivering products to end-users to providing the functions that users value, in a closed material cycle, thus also responding to sustainability imperatives. These models require innovation not only in design and delivery, but also in pricing structures, consumer engagement, and after-sales systems (Lüdeke-Freund, Gold, & Bocken, 2019). For example, Philips' *Pay-per-Lux* model enables customers to pay for lighting services rather than purchasing light fixtures, aligning profitability with product longevity rather than volume (Lacy & Rutqvist, 2015). Patagonia's *Worn Wear* initiative also demonstrates how firms can build reputational capital and financial stability through after-sales services such as repair, resale, and buy-back programs (Tukker, 2015). These cases suggest that circular business models can succeed

commercially by redefining value propositions around stewardship, durability, and shared ownership. However, for such models to scale, broader shifts in consumer behavior, financial evaluation metrics, and policy frameworks are needed to systematically reward sufficiency-oriented business strategies.

Transitioning to a CE ultimately demands a shift in incentives: companies should be rewarded not for selling more products, but for selling better, fewer products. This principle is increasingly reflected in emerging policy frameworks that seek to realign economic success with environmental boundaries. At the European level, the Green Deal and the Circular Economy Action Plan aim to decouple economic growth from resource use by promoting circular design, product durability, and business models that extend product lifecycles (European Commission, 2019, 2020). Initiatives such as the Sustainable Product Regulation and the Extended Producer Responsibility schemes represent early institutional attempts to reward companies for sufficiency-oriented strategies rather than throughput. In that regard, one of the most innovative tools in this regulatory landscape is the Digital Product Passport (DPP), which ensures traceability and transparency in material flows by providing key data on product sustainability, recyclability, and composition (Jensen et al., 2023). Regulations on repairability and durability have also emerged, such as the Right to Repair initiative, support product longevity by ensuring that consumers and businesses have access to spare parts and repair information, thus reducing planned obsolescence and extending product lifecycles (Augenhofer, Atamer, & Poludniak Gierz, 2023).

However, several factors still hinder the adoption of circular business models. As the traditional linear economy remains highly profitable, the lack of investment and viable business cases make companies hesitant to shift toward circular practices (Ali, Uddin, & Petrillo, 2024), and take on the regulatory complexities that such a shift typically entails (Ho, Haaker, & Yishake, 2025). Smaller firms lack the capacity to develop large-scale circular systems (Fischer et al., 2024), while collaboration between smaller firms is hindered by their technological orientation and because they operate on different markets (Kuhmonen et al., 2024). Financial constraints are an additional challenge as the spreading of revenue generation over a longer period creates delayed cash-flows and increases financial complexity, thereby discouraging investment in circular business models (Asante-Darko, Dadzie, & Kwarteng, 2024; Cordeiro & Sindhøj, 2024). Moreover, the uncertain residual value of materials complicates the valuation and monetization of reused or recycled products (Zink & Geyer, 2017). Lastly, due to industry fragmentation, firms specialize in only a small part of the product lifecycle, which makes it difficult to coordinate, for instance to source inputs that comply with circular practices, and leads to inefficiency (Ranta et al., 2018).

Overall, the CE necessitates new business logics, models, and innovation. These can be achieved by a variety of strategies and tools. Policies and regulations have proven to be important enablers or hindrances for the realisation of circular business models. Additionally, such business models often require a change in the domain of consumption and user practices as well as governance as further discussed below.

2.2 Consumption and user practices

Consumption and user practices are discussed from different theoretical and conceptual perspectives, such as acceptance, legitimacy, and praxeology. The literature covers among others the involvement of consumers as active users or prosumers in the CE (Hobson, 2015), the adoption and acceptance of circular technologies, products, and business models (Camacho-Otero, Boks, & Pettersen, 2018), and the transformation of collectively shared and

institutionalized consumption practices (Hobson, 2015; Jaeger-Erben, Frick, & Hipp, 2021). These theoretical perspectives foreground different enablers, barriers, and actors in multi-level settings, and identify the importance of both individual acceptance and collective legitimacy for changing consumption choices and behaviour. Individual acceptance is "a favourable or positive response (including attitude, intention, behaviour and – where appropriate – use) relating to a proposed or in situ technology or socio-technical system, by members of a given social unit (country or region, community or town and household, organization)" (Upham, Oltra, & Boso, 2015, p. 103). Collective legitimacy concerns the "generalised perception or assumption that the actions of an entity are desirable, proper, or appropriate within some socially constructed system of norms, values, beliefs, and definitions" (Suchman, 1995, p. 574). Following Alsheimer et al. (2025), we can understand acceptance as the individual order, while legitimacy refers to the social order.

Kirchherr et al. (2018) identify consumer acceptance and interest as a key barrier to CE (from the perspective of business and policy practitioners). Acceptance of the CE is shaped by milieu- and society-specific norms and values, as well as individual perceptions of economic and environmental benefits (Aschemann-Witzel & Stangherlin, 2021; Camacho-Otero, Boks, & Pettersen, 2018). Lack of knowledge (e.g., regarding durability and functionality), lack of convenience (i.e., ease of adjustment), and lack of moral motivation (i.e., value-based) for waste recycling and packaging waste prevention are considered to negatively influence acceptance (Fogt Jacobsen, Pedersen, & Thogersen, 2022). The active involvement of consumers in the design phase of products is considered to influence consumption choices (Camacho-Otero, Boks, & Pettersen, 2018; Mugge, Jockin, & Bocken, 2017), and can generate legitimacy for this product.

Consumption choices are also influenced by different risk perceptions. For example, Matsumoto, Chinen, and Endo (2016) discuss how Japanese consumers are more critical of remanufactured auto parts compared to the US due to risk perceptions and lack of perceived benefits. Different actors are thought to influence the acceptance and legitimacy of consumption changes in the CE. Hazen, Mollenkopf, and Wang (2016) show that businesses and policy makers have the tools to and are important for shaping consumption practices. For instance, awareness raising campaigns, capacity building, and social innovation can contribute to changed consumption behaviour (Al-Obadi et al., 2022). Conceptualising consumer agency, Lang et al. (2023) discuss a continuum from a passive consumer to an active consumer: At one end, consumers influence business decisions either in favour or against circular and sustainable practices through purchasing (passive consumers), while at the other end, co-creation of value is assumed through consumer co-ownership. In between, consumers can affect circular developments through political advocating, engaging in circular practices, or shaping societal normative directions.

Perspectives based on social practice theory point out that "patterns of action (e.g., showering) are co-constituted by histories, technologies, norms and preferences around issues of cleanliness." (Hobson, 2015, p. 97). As a result, consumers are not rational subjects, and "repair does not seem to be a one-time decision but relates to a process of valuation and devaluation of an object, its utility value [...] and its trade value [...] in comparison with other, particularly newer products" (Jaeger-Erben, Frick, & Hipp, 2021, p. 2). Social practice theory suggests that the collective production of specific orders of practices, including the meanings and values ascribed to them, structures the agency of individual consumers.

In sum, changes in consumption are orchestrated at multiple levels, and depend on individual acceptance, collective legitimacy, and changes in the order of social practices. Various actors can affect these underlying drivers of consumption practices. The literature discusses a reframing of the consumer from passive to active (Silva & Nilsson, 2025), and towards a role as prosumer.

Policy makers and firms have the power to both promote and hinder changes in consumption practices. Changes often require experimentation with and discovery of new practices that work, enhanced awareness, and new knowledge and capacities of involved actors.

2.3 Modes of governance

The governance of GVCs is interactively shaped by internal power dynamics between transnational corporations, their suppliers, and by external influences, like the regulatory, institutional contexts, and geography (Kano, Tsang, & Yeung, 2020). On the one hand, the literature focusses on the governance within GVCs, meaning how rules for participation are defined and by whom. This stream of work highlights three supply chain variables: the complexity of transactions, the codifiability of transactions, and the capabilities within the supply base. On the other hand, a broader view is advanced depicting governance to drive or enable the transition process. This view integrates a multi-level perspective on governance (beyond the governance of specific GVCs) involving also a plurality of firm and non-firm actors (Kano, Tsang, & Yeung, 2020).

Vertical governance structures have been traditionally dominated by lead firms orchestrating control over suppliers (Gereffi, Humphrey, & Sturgeon, 2005). While orchestration by large firms can drive the transition toward circularity, it may also prioritize profit maximization over genuine sustainability improvements which, to be effective, must be assessed against absolute sustainability thresholds, rather than relative performance gains (Bjørn et al., 2016; Häyhä et al., 2016). In other words, ensuring that circular business models contribute to staying within planetary boundaries, rather than merely improving efficiency, becomes a central governance challenge. The shift towards Extended Producer Responsibility (EPR) further pushes transnational corporations to engage both upstream and downstream actors, ensuring that sustainability standards cascade through supply networks (OECD, 2016). As transaction complexity and governance mechanisms evolve with firms integrating sustainability criteria into procurement and supplier management (Pagell & Wu, 2009), governance in GVCs will progressively rely on strategic coordination mechanisms**,** such as long-term partnerships, transparency requirements, and certification schemes.

In addition to strategic alignment, steering value chains toward sustainability will increasingly depend on robust data infrastructures (Krishnan, Valentina, & and Ponte, 2023). Governance systems must enable the collection of reliable data and the development of appropriate indicators and statistics to monitor environmental and social impacts across value chains. Such monitoring should be benchmarked against absolute sustainability criteria, ensuring that progress is evaluated relative to ecological ceilings and social foundations. Instruments such as Digital Product Passports (DPPs), corporate sustainability reporting standards, and material flow accounting frameworks play a key role in making sustainability performance visible, traceable, and comparable (Jensen et al., 2023). Setting up governance mechanisms to ensure control, verification, and harmonization of environmental and social standards - through mandatory disclosures, third-party certifications, and digital traceability systems - is therefore critical to facilitating genuine circular transitions.

At the horizontal level, governance structures are shifting from firm-centric to multi-scalar coordination, involving a plurality of actors, like governments, NGOs, industry alliances, and standard-setting bodies (Ponte & Sturgeon, 2014). However, governance fragmentation remains a major challenge, as conflicting policy frameworks across regions can create inefficiencies and barriers to circular trade flows (Mandal et al., 2025). Horizontal governance for the shift from GVCs towards CSCs will require policy coherence, knowledge-sharing mechanisms, and stakeholder

engagement at multiple governance levels. Public-private collaborations are becoming increasingly significant in governing CE transitions, with states offering financial incentives, infrastructure support, and legislative frameworks to facilitate circular business practices (Akomea-Frimpong et al., 2024). Multi-sectoral governance, particularly in industries such as electronics and textiles, is crucial for scaling circular practices, given the need for standardization around repairability, recyclability, and waste valorization (Tajally, Vamarzani, & Ghanavati-Nejad, 2025).

Importantly, the transformation from GVCs of the linear economy orchestrated by transnational corporations towards CSCs where new functions and actors are integrated who complement existing supply chains with new capabilities and resources may entail a change in power relations and governance. Due to the integration of new functions and actors, often in closer geographic proximity, the horizontal governance dimension (across sectors) expectedly becomes more important. Furthermore, as a transformation in the making is more explorative in nature than exploitative (March, 1991), where learning and innovation is in the focus and not efficiency, this would benefit of a more horizontal networked governance mode rather than vertical controlled relationships.

2.4 Policies and discourses

The domain of policies and discourses, as already indicated in the sub-sections above, plays a central role in either enabling or hindering transformations from linear GVCs to CSCs. Policies, and the discourses on which they are based, can give directionality to enable sustainability and CSCs by targeting both firms who produce products and those who consume them. Regulations such as the Ecodesign for Sustainable Products Regulation (ESPR) and Product and Packaging Waste Regulation (PPWR) enable circular business models, and coordinated policies across policy levels may mitigate the risk of governance fragmentation. However, CE discourses have so far been dominated by stakeholders and actors who articulated circular visions that align mainly with their own interests, often failing to provide a holistic perspective about how transformations to CSCs can be achieved (Calisto Friant, Vermeulen, & Salomone, 2020). Moreover, the European Union, like other high-level policy actors, are guided by a discourse, which proclaims that economic growth and ecological sustainability can be reconciled through technological innovations (particular in recycling) and more efficient production and consumption (Leipold, 2021). This orientation towards economic growth and competitiveness as a fundamental pillar, combined with sustainability, has been further strengthened in recent EU-level discourses (e.g., as articulated in the "Draghi report" 2024). This has been criticised for leading to incremental changes and giving agency to incumbents (Leipold, 2021; Rizos & Bryhn, 2022), as a transformative and disruptive approach is a threat to current balance of power and resources (Avdeitchikova & Schwaag Serger, 2024).

However, long-term transformative change requires comprehensive system innovations, including novel configurations of actors, institutions, and practices (Weber & Rohracher, 2012), as well as new relationships between the state, the market, and civil society, where the state may have to act more pro-actively and entrepreneurial (Schot & Steinmueller, 2018). There is an increasing consensus among both policymakers and researchers that innovation policy is an area that can and should drive transformation (Rohne Till et al., 2024; Schwaag Serger et al., 2023). This can be accomplished by both supply- and demand-oriented policy instruments (Laatsit, Grillitsch, & Fünfschilling, 2025). A more active role of the state in innovation policy has also become more widely accepted (Avdeitchikova & Schwaag Serger, 2024). Changes in regulations

are considered a key factor for addressing sustainability problems (Flanagan, Uyarra, & Wanzenböck, 2022).

As a means of engaging a multitude of actors in a collective effort to tackle clearly communicated challenges, Mission-oriented Innovation Policies (MOIP) have gained rapid popularity among many national governments across Europe (Avdeitchikova & Schwaag Serger, 2024; Mazzucato, 2018; Wanzenböck et al., 2020). MOIPs include a mix of different policy instruments which also include ideas about the processes through which such instruments emerge and interact (Rogge & Reichardt, 2016). Accordingly, the success of policy mixes depends on the consistency of elements (strategies and instruments), coherency in the process, credibility and comprehensiveness. Coordination, which is a challenge in policy making in general, has proven to be even more difficult within transformative policies due to its systemic ambitions (Borrás & Schwaag Serger, 2022). Coordination is required horizontally (across different industries and different units within political-administrative levels) as well as vertically (across scales such as local, regional, national, and supranational) as already mentioned in relation to the governance of shifts from GVCs to CSCs. Without coordination across instruments in the policy mixes and across stakeholders, policies risk not delivering their intended outcomes. To exemplify, as of January 2025 all EU states needs to collect used textiles for recycling, a policy decided on EU-level and operationalised on the local level. However, with a producer responsibility for recycling in the industry expected first in 2028, recycling facilities have not been developed, leaving local actors with large amount of textile waste. Instead of being recycled, textile waste has so far been exported, incinerated, and negatively impacted not-for-profit organisations in this sector (for coverage in Swedish media, see e.g. Fritze, 2025; Hult, 2025). To improve policy success, it is important to evaluate policy, learn from policy failures, and thereby develop the required reflexivity to adapt and improve policies to reach long-term goals (Haddad & Bergek, 2023).

Due to the transformative ambitions with the current policy frame (since circa a decade), there are reasons for engaging in supranational policymaking. However, also regional and local contexts can be effective levels for MOIPs (Uyarra et al., 2025). To exemplify the need for supranational policies, Giorgi et al. (2022) highlight a policy gap within the European construction sector (the highest producer of waste and one of the main causes of resource consumption) where resource scarce (raw materials) countries are better at encouraging recycling, while for example Italy, with large quantities of untaxed raw materials, virgin materials remain too cheap, promoting traditional consumer behaviour. Yet, regulating at a supranational level is challenging. D'Adamo et al. (2022) criticizes EU Waste regulations for overlooking the differences in waste streams (volumes, embedded materials, and management policies) requiring both behavioural policies to be able to accelerate transition. Wanzenböck and Frenken (2020) argue that some of the complexities and contestations of mission-oriented policies could be best navigated and resolved at the local level, suggesting that local and regional policy levels should receive more attention. Hence, rather than looking at a specific policy or discourse, the synergies, tensions, and trade-offs between policy domains and levels of governance will be decisive for a shift towards CSCs.

3 Situating Arenas of Change

Arenas of Change are situated in concrete contexts that make it possible or impossible to achieve more sustainable material flows. The contexts are conceptualised as the specific combination of conditions enabling or hindering actors to engage in change processes towards CSCs. Importantly, the concrete contexts framing Arenas of Change are situated in a multi-level

architecture. This means that the change that is possible in a particular interaction space, meaning an Arena of Change, depends on policies and discourses constituted at different levels (sub-national, national, international), business models that often bind together different places, horizontal and vertical governance structures, as well as consumption and user practices of goods and services produced and distributed across space. Hence, Arenas of Change draw attention to the combinations of conditions that make it possible and could accelerate a shift from GVCs to CSCs, as well as the complexity that arises due to the interplay between the domains and levels.

Figure 2 illustrates the situatedness of Arenas of Change. We perceive Arenas of Change to emerge in specific nodes or segments of GVCs. An Arena of Change is then composed of networks of actors who will partly belong to existing nodes of GVCs and partly be located outside these nodes. Yet, all actors will be embedded in multi-level institutional architectures and are thus enabled and constrained by very concrete combinations of conditions. To conceptualize the context in which Arenas of Change emerge, develop, succeed or fail, we thus build on established innovation systems literature differentiating between the regional, national and global level, as well as literature on socio-technical systems. Here, we will refer to some key concepts in these streams of literature and discuss their relevance for Arenas of Change. Given the scope of this paper, this has a rather illustrative purpose by focussing on some important aspects rather than aiming at a comprehensive coverage of each stream of literature.

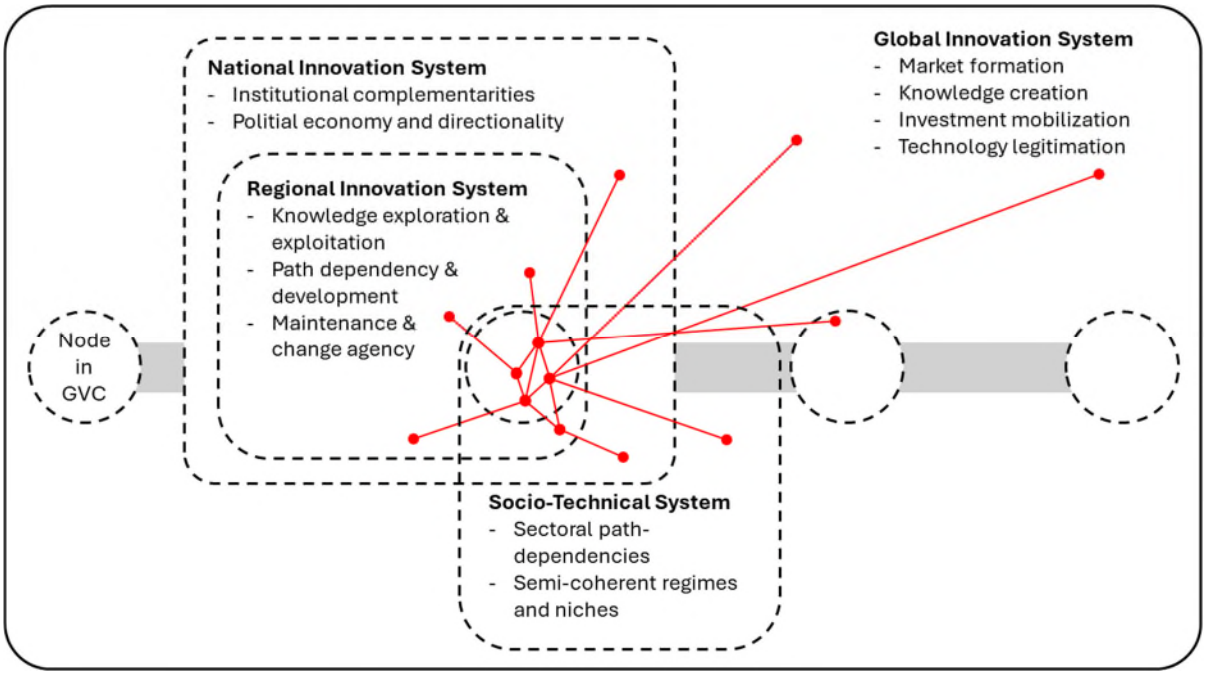

Figure 2: Situating Arenas of Change

First, the literature on regional innovation systems situates specific industrial clusters and economic activities, in this case nodes in GVCs, in a broader context foregrounding the flows and interactions between subsystems of knowledge exploration and knowledge exploitation (Autio, 1998; Tödtling & Trippl, 2005). The local environment provides the opportunity to link new actors with complementary knowledge and resources to an Arena of Change, where localized learning can be promoted through geographical proximity as well as a shared institutional context (Malmberg & Maskell, 2006; Storper, 1995). This would include actors contributing to knowledge

exploration such as universities, research organisations, or technology transfer organisations, as well as actors focussing on knowledge exploitation, that is the generation of value from knowledge through innovation.

One important theme in the literature on regional innovation systems is the study of regional industrial path dependencies, which foreground the difficulty to change the direction of industrial paths due to cognitive, functional, and political-institutional lock-ins (Grabher, 1993; Hassink, 2010; Martin & Sunley, 2006). This is particularly relevant in the context of GVCs where power tends to be concentrated with transnational corporations. Even though the level of autonomy of local actors differs depending on the mode of governance in a GVC (Gereffi, Humphrey, & Sturgeon, 2005), nodes in GVCs are often subject to dependency relations (MacKinnon, 2012). New path development, and in particular unrelated diversification linking new actors, capabilities and resources, is studied as process through which regions may overcome lock-ins (Boschma et al., 2017; Grillitsch, Asheim, & Trippl, 2018). New path development requires the engagement of local actors in change processes, which has been studied under the notion of change agency (Dawley, 2014; Garud, Kumaraswamy, & Karnøe, 2010; Uyarra et al., 2017). Studies shows that multiple firm-level and system-level actors engage in multiple ways in institutional change, place leadership and innovation to effectuate transformations in development paths (Grillitsch et al., 2023; Isaksen et al., 2019; Sotarauta, Kurikka, & Kolehmainen, 2023). Yet, change agency is conditioned by time- and space-specific opportunity spaces, as well as actors' perceptions and capabilities to engage in change processes (Grillitsch & Sotarauta, 2020; Kurikka et al., 2023).

Regional innovation systems are embedded in national innovation systems (Asheim & Coenen, 2005). The literature on national innovation systems emphasises the institutional embedding of interactive learning processes and knowledge that underpin innovation (Lundvall, 1992). Accordingly, innovation activities co-evolve with institutions shaping distinct economic trajectories (Freeman, 1995; Nelson, 1993). The importance of the national level, the persistence of differences and relative stability in the institutional architecture of countries is explained with institutional complementarities, which arise when one institution increases the return of another institution (Hall & Gingerich, 2009). Institutional complementarities are embedded in a broad spectrum of the political economy and explain the comparative advantage of nations in certain in industries and sectors of economic activity (Hall & Soskice, 2001). The implication for Arenas of Change is that the opportunities to realise changes from GVCs to CSCs will differ across national contexts, and also learning processes and knowledge that could be accessed through linking up to actors at the national level will be conditioned by this embedding within national systems of innovation.

The political economy playing out at the national level has increased in relevance and importance for providing directionality, on the one hand, towards addressing sustainability imperatives (Schot & Steinmueller, 2018), and, on the other, to deal with challenges of geo-political rivalries (Edler et al., 2023). Importantly in this context, the state has recently been rediscovered as important shaper of innovation capabilities, often being the main risk taker through mission-oriented innovation policies (Mazzucato, 2015, 2018). Furthermore, it is also with the power of the nation state that new industrial policies are rolled out to develop leadership in strategically important industries such as semiconductors or clean technologies (Aiginger & Rodrik, 2020; Butollo et al., 2024; Juhász, Lane, & Rodrik, 2023). For the purpose of moving from GVCs to CSCs the combination of sustainability and geopolitical conditionalities potentially create opportunities, as both tend to promote a reorganization and rescaling of economic activities (Grillitsch et al., 2024).

Finally, the literature on global innovation systems emphasises how innovation processes co-evolve through systems at different scales - regional, national, transnational, and global - that are structurally coupled in GVCs. This literature distinguishes four processes: knowledge creation, market formation, investment mobilisation, and technology legitimation in a multi-scalar architecture (Binz & Truffer, 2017). Particularly in science and technology-driven industries such as biotechnology, knowledge creation depends on spillovers generated at global conferences or along GVCs, and investment mobilisation depends on multinational firms. Furthermore, local resource scarcities can be compensated with global resource mobilisation (Heiberg & Truffer, 2022). Market formation refers to the creation of market segments in different economies according to valuation processes and technology legitimacy (Binz & Truffer, 2017). This perspective helps to understand how Arenas of Change are associated with a multi-scalar architecture spanning regional, national and global innovation systems, where different actors such as firms, consultants, and intermediaries need to collaborate for circular innovation and changed value chain configurations. Respective studies emphasise that firms compete in global markets (e.g., Hipp & Binz, 2020) and, in this context, market formation as a condition for the adoption of innovation, which eventually will translate into novel couplings between regional economic actors and global economic processes (Friedrich et al., 2025).

In parallel, a sectoral or field perspective, such as through the notion of socio-technical systems, contributes to situating Arenas of Change by accentuating sector-specific conditions that enable or hinder the transformation from GVCs to CSCs. Such a perspective documents how GVCs are embedded in globally integrated sectoral developments (Fuenfschilling & Binz, 2018). It highlights the importance of actors, technologies, regulations, discourses, and cultural meanings for the long-term development of sectors, and how these influence sustainable outcomes (Geels, 2004). Socio-technical systems involve the interaction of different actors such as firms, consumers, NGOs, political actors, etc. and their variegated power dynamics (Avelino & Wittmayer, 2015). The combinations of actors, technologies, and institutions in semi-coherent regimes (Fuenfschilling & Truffer, 2014) at different levels such as national and global (Fuenfschilling & Binz, 2018) generate specific sectoral path dependencies that often shape incremental innovation and development outcomes. More radical innovation, developed in so-called niches, will eventually create transition dynamics and reconfigure the existing socio-technical regime (Geels, 2004). Such a perspective emphasises the long-term sectoral conditions and developments that accompany, enable or hinder developments from GVCs to CSCs. For Arenas of Change it is important to appreciate sectoral path dependencies, including existing material infrastructures, different actors (including consumers) and institutions (regulations, beliefs, etc.). Such path dependencies may have implications for the inertia of existing GVCs and the emergence of novel CSCs. Yet, recent literature in transition research also pays attention to the interaction of different socio-technical systems (e.g., Andersen & Geels, 2023), for example through novel circular technologies or value chains. This connects to our understanding of Arenas of Change, where new actor constellations are formed, breaking with sectoral path-dependencies, but where Arenas of Change can also be affected by different - potentially conflicting - sectoral developments.

4 Conclusions

While the CE is propagated as an economic model that could combine prosperity with environmental sustainability it hardly engages with how global value chains (GVCs) dominating the current organisation of the economy could be transformed into circular supply chains (CSCs). Furthermore, operationalisations and studies of change processes towards the CE often fall short

of covering comprehensively the interaction of domains that ultimately determine the outcomes of such processes. To address these issues and contribute to studying, affecting and accelerating transformations of GVCs towards circularity and sustainability, we propose the concept of Arenas of Change. The idea with Arenas of Change is to draw attention to concrete settings of actors, their networks, and institutional embeddedness, and the opportunities (and limitations) in such concrete settings to transform processes and practices of production, distribution, and consumption of goods, as well as the recovery and minimisation of waste. Such concrete settings could be as diverse as retail stores, procurement units, industrial sites, or marketplaces, as well as virtual spaces like online marketplaces. Even though limiting the focus to a particular element of GVCs, the proposition is that Arenas of Change can lead to radical change, for instance, reshaping the available product portfolio in retail stores, disrupting upstream supply chains, redirecting energy and material flows, and changing consumer behaviour. Arenas of Change are ultimately about identifying and activating levers that could accelerate changes toward circularity and sustainability.

Consequently, an important step for studying, affecting, and accelerating transformations of GVCs towards CSCs would be to identify where actors see opportunities or challenges to make changes towards circularity and sustainability, and how such a change would look like. Building on an understanding of Arenas of Change as networked actors in context, this would entail identifying relevant actors within existing GVCs as well as complementary actors who are engaged in, could facilitate, or make possible desired changes, and the interdependencies and power relations between them. Such an analysis needs to be attentive to the position of actors in regional, national or global innovation systems, as well as within and outside the respective value chains and socio-technical systems. This would allow for the delineation, description, and study the nature of an Arena of Change, to analyse how and why new constellations of actors that cross boundaries of existing systems form, and to investigate enabling or hindering conditions as well as actor strategies.

Viewing Arenas of Change as concrete and contextual encompasses a large variety of actor configurations, aspirations, and strategies. However, our proposition is that affecting and accelerating transformations of GVCs towards CSCs rests on realising synergetic or complementary changes in four domains i) business logics, models, and innovation; ii) consumption and user practices, iii) modes of governance, and iv) policies and discourses. This proposition implies that complementary changes in different domains can yield fast and fundamental changes in GVCs. However, this interdependence between domains would also be a key source of rigidity as changes in only one domain would often fail to transform GVCs to CSCs. Applying the concept of Arenas of Change would thus require a comprehensive analysis about the necessary combinations of changes in the different domains that could make transformations possible. It is also possible that – depending on the context – different sets of combinations could be successful in delivering a transformation of GVCs or fail to do so. Studies of Arenas of Change would identify how and why actors engage in changing certain domains, while possibly ignoring others. By shedding light on the interdependencies between domains, such studies could then also explain or predict failures. This is when actors ignored or were unable to realise complementary changes in the different domains.

Due to the focus on the agency of sets of actors, Arenas of Change can be studied well through a bottom-up perspective zooming in on change processes in concrete settings (cf. Asheim, 2020). This would highlight how different actor groups envision a transformation from current unsustainable to sustainable practices, how contestations are dealt with and navigated, what

agency exists for which actor group to engage in change processes, and what implications this has for sustainability outcomes (e.g., use of virgin material, waste, just transition). It would identify and explain the origin of changes in the four domains, how they interact with each other, what the enabling and hindering conditions for change are in concrete settings, and which successful or unsuccessful strategies actors have applied to overcome the observed challenges.

Understanding transformations through the lens of Arenas of Change rests on a combinatorial or configurational logic (cf. Rutten, 2020). This logic suggests, on the one hand, that there are some generic causal powers, which are latent in the capability of actors to work for change and the four aforementioned domains, and which are mobilised by the set of actors in the interaction spaces defined as Arenas of Change. On the other hand, it postulates that various combinations exist how these powers, or more concretely, how changes in the four domains together lead to transformations towards CSCs. Studies on Arenas of Change would identify varieties of transformation pathways. Furthermore, it can be expected that transformation pathways are context-dependent, which means that they will differ between sectors and geographic contexts. This lends itself to comparative research designs to identify what works in different sectoral or geographical contexts.

Having advocated a bottom-up, combinatorial, and comparative perspective, Arenas of Change could also be a useful entry point to study the effect of structural elements. For instance, the starting point could be specific policies, policy mixes or interventions at different levels, followed up by investigations how these restrain, or trigger and shape change processes in a set of Arenas of Change, and thereby assess their effectiveness. Arenas of Change could also be appropriate to investigate the possibilities for alternative production systems and business models and how they interact with consumption and user practices. Furthermore, we see Arenas of Change as a concept that could be used in an experimental setting where actors aim to learn and develop pathways to circular and sustainable value chains, providing analytical power and guidance in identifying the levers and hinders for transformative change.

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