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EDITED BY
Araz Taeihagh,
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REVIEWED BY
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Nordland Research Institute, Norway
Krizia Magallanes,
Ewha Womans University, Republic of Korea

*CORRESPONDENCE
Julius P. Wesche
julius.wesche@ntnu.no

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Coalitions, coordination, and contestation: a systematic review of the advocacy coalition framework and its implications for sustainability transitions research

Julius P. Wesche[1,2,3]*, Elisabeth Dütschke[1], Simona O. Negro[2] and Marko P. Hekkert[2]

[1]Fraunhofer Institute for Systems and Innovation Research (ISI), Karlsruhe, Germany, [2]Department of Interdisciplinary Studies of Culture, Norwegian University of Science and Technology (NTNU), Utrecht, Netherlands, [3]Energy Research Group at the Department of Interdisciplinary Studies of Culture (KULT-Energy), Norwegian University of Science and Technology (NTNU), Trondheim, Norway

Introduction: Achieving sustainability transitions requires substantial policy changes, often driven by coalitions of actors advocating for institutional change and transformative agendas. While the transitions literature highlights the importance of coalition coordination, the underlying processes remain insufficiently understood. This study explores the Advocacy Coalition Framework (ACF) to derive insights into the coordination and dynamics of advocacy coalitions relevant to sustainability transitions.

Methods: A systematic review of ACF literature was conducted, encompassing an initial corpus of over 700 articles and refining it to a final set of 45 documents. These documents were analyzed using qualitative coding to identify key factors influencing coalition coordination and to conceptualize coalition dynamics across the phases of sustainability transitions.

Results: The review identifies four categories of factors shaping coalition coordination: prerequisites for coordination, reasons to coordinate, instrumental factors that influence coordination, and internal organization of coalitions. Additionally, it outlines how coordination patterns evolve across four sustainability transition phases, leading to the development of a typology that integrates dynamics within coalitions and across coalitions with two transition pathways: technological substitution and reconfiguration.

Discussion: This study advances the understanding of the political processes underpinning sustainability transitions by integrating ACF insights into transition studies. It underscores the importance of belief systems, resource access, and trust in fostering effective coalition coordination. The proposed typology offers a conceptual framework to guide future empirical research on coalition dynamics and their role in accelerating sustainability transitions.

KEYWORDS

advocacy coalition framework (ACF), sustainability transitions, coordination, collective action, systematic review, collaboration, cooperation

1 Introduction

Sustainability transitions can be understood as the transformation of socio-technical systems towards a more sustainable provision of societal functions, such as energy or mobility (Markard et al., 2012). The innovations that can provide these functions in more sustainable ways often emerge in niches. These niches provide a protective space for innovations (Kemp

et al., 1998; Smith and Raven, 2012). Initial protection is key, especially as radical innovations often cannot compete successfully in selection environments dominated by incumbent regime actors (Smith and Raven, 2012). If radical innovations are to develop beyond such niches and become competitive (Aldrich and Fiol, 1994; Hekkert et al., 2007; Wieczorek and Hekkert, 2012), changes in the institutional selection environment are required (Geels, 2004; Fuenfschilling and Truffer, 2014). Hence, changes in (public) policy are key for the adaptation of institutional selection environments (Smith et al., 2005).

To create favorable institutional conditions for new developments, actors often aim to change policy frameworks in order to align them better with the socio-technical configuration in scope. Hence, policy change is the outcome of institutional work and institutional entrepreneurship by individual or collective actors (Lawrence et al., 2011; Jolly and Raven, 2015; Hoogstraaten et al., 2020), and this is referred to as the policy process (Weible and Sabatier, 2017). In socio-technical systems, regime actors often control the policy process to maintain the status quo (Rip and Kemp, 1998; Smink et al., 2015). To facilitate novelty, actors must navigate the complex task of gaining political power within a regime with entrenched legitimacy, resources and networks. Dominating the policy process is a collective endeavor, necessitating the coordination and interest alignment of various actors. Although there have been significant insights into the politics of sustainability transitions (Köhler et al., 2019), the collective actions driving policy change remain less explored in transition literature. Additionally, the institutional entrepreneurship has had relatively little impact on the field of innovation and transition studies (Hoogstraaten et al., 2020, p. 129). In an attempt to help unpack the coordination and alignment processes in socio-technical systems, this paper presents a review of the Advocacy Coalition framework (ACF), with a specific focus on coordination and alignment processes.

The ACF is a prominent policy process framework that puts actors and their agency centre-stage and acknowledges that policy change is a result of successful collective action (Sabatier, 1988; Weible and Sabatier, 2018; Weible et al., 2020). A key tenet of the framework is the idea that policy actors with a variety of backgrounds but similar policy beliefs may join forces and coordinate action with the aim to attain political dominance in a policy subsystem (Weible et al., 2020). Once such dominance is achieved, they work towards implementing policies that reflect their beliefs, goals and interests (Sabatier, 1988; Jenkins-Smith and Sabatier, 1994; Sabatier, 1998). We argue that the ACF helps address these limitations by focusing on how actors with shared beliefs coordinate to form coalitions that can influence policy subsystems, which is particularly relevant for understanding sustainability transitions. Unlike broader institutional theories or organizational studies, the ACF emphasizes belief systems, coalition dynamics, and policy influence, thereby offering a distinct approach to unpacking the political processes that drive collective action in socio-technical systems.

To facilitate the unpacking of the coordinated collective action processes in socio-technical systems that contribute to sustainability transitions, the first aim of the paper is to answer the following research question: *What determines the coordination of actors in political processes?* Based on the answers to this research question, the second aim of the paper is to identify the implications for the field of sustainability transitions studies.

The paper's fundamental premise is that the coordination and alignment of actors plays a pivotal role as a key condition for policy change, ultimately paving the way for the occurrence of policy change that leads to sustainability transitions. As a result, the primary focus of the literature analysis centers around the intricate dynamics of coordination, rather than emphasizing the policy changes that successful coordination can bring about.

2 Theory

2.1 Coordination in sustainability transitions

Transitions are understood as far-reaching changes in socio-technical systems that are aimed at providing specific societal functions, such as mobility or energy services (Markard et al., 2012). Sustainability transitions can be understood as the transformation of socio-technical systems towards a sustainable provision of these societal functions. Novel socio-technical innovations that can contribute to a more sustainable provision of societal functions emerge in niches, where they are nurtured and protected from the current selection environment (Hoogma et al., 2005). Due to this protection and nurturing, incremental innovations may become competitive within unchanged selection environments (Smith and Raven, 2012). However, although the initial protection and nurturing in niches is vital, it may not be sufficient for radical innovations to thrive. For radical innovations to become competitive, the institutional selection environment usually needs to be adapted (Fuenfschilling and Truffer, 2014). Policy change, facilitated by collective efforts rather than individual actions, is a key driver for adapting these environments (Aldrich and Fiol, 1994; Hargrave and van de Ven, 2006).

The role of coordination and coalition-building is repeatedly emphasized in socio-technical transition literature as being necessary for aligning actors and modifying selection environments for innovations (for example, Smith et al., 2005; Kern and Rogge, 2018). Evidence from empirical transition studies supports the notion that coordinated actions within coalitions can effectively pressure changes in policy to favor niche innovations, as demonstrated by several studies (Jacobsson and Bergek, 2004; Negro and Hekkert, 2008; Ulmanen et al., 2009; Ulmanen et al., 2015; Geels et al., 2016; Hess, 2019). Despite this emphasis, there is a gap in the transition literature concerning the integration of knowledge from fields that specialize in coalition coordination and policy change. To address this, we employ the Advocacy Coalition Framework (ACF) as a body of literature that focuses specifically on the coordination of individuals and policy change for a detailed look at how coordinated action leads to policy changes, in response to the call for a politically informed perspective on sustainability transitions (Meadowcroft, 2011; Kern and Rogge, 2018). In doing so, we respond to Meadowcroft's call for the development of "a politically oriented literature on sustainability transitions" (Meadowcroft, 2011), and we address Kern and Rogge's point that "transition scholars have so far made relatively limited use of [policy] theories in studies of the politics of transitions" (Kern and Rogge, 2018, p. 102), and that "transition studies should be cross-fertilized by the field of policy studies that has developed a variety of analytical approaches to analyse policy processes and their outputs" (Kern and Rogge, 2018, p. 102). The ACF provides a detailed lens through which to understand coalition formation, emphasizing shared belief systems, coordination strategies, and policy influence within a political subsystem. Unlike other theoretical approaches, such as institutional theory or organizational studies, which tend to focus on either structural institutional factors or individual agency, the ACF

directly addresses the interplay between beliefs, coalition strategies, and policy outcomes. This focus makes it particularly well-suited for examining the collective dynamics necessary for adapting institutional environments to favor sustainability transitions.

2.2 The advocacy coalition framework

The ACF is "one of the most established and successful approaches for understanding policy processes across the globe" (Weible et al., 2020). It explains policy change through the lens of advocacy coalitions, which are groups of actors within a policy subsystem that coordinate activities over time to influence policy (Sabatier, 1988; Jenkins-Smith and Sabatier, 1994). A policy subsystem in the Advocacy Coalition Framework includes all actors—government officials, interest groups, researchers, media, the public, political parties, private sector entities, and advocacy coalitions—engaged in shaping policy within a specific issue area and geographic context (Sabatier, 1988, p. 138).

Coalitions are diverse, including parliament members, bureaucrats, industry groups, researchers, journalists, party representatives, think tanks and grassroots entities (Sabatier, 1988; Weible and Ingold, 2018). The term "actor" is preferred in ACF literature to emphasize the roles assumed by people in organizations and policy subsystems, denoting the agency they have in their decisions (Weible and Ingold, 2018, p. 325). Meanwhile, non-institutionalized individuals such as citizens, are viewed as supporters, not direct coalition members (Weible and Ingold, 2018, p. 332). Such coalition members are also termed "policy elites" (Henry, 2011) or "policy actors" (Pierce et al., 2017).

Coordination among these actors involves adjusting political strategies to align with others' activities for shared goals (Zafonte and Sabatier, 1998). To sway policymaking, coalitions use resources ranging from public support and alliances to authoritative access, funds, scientific data and effective leadership (Weible et al., 2020).

The ACF posits that actors join coalitions when they share overlapping beliefs, and this is a concept that has been thoroughly dissected by its scholars. These beliefs are structured into a hierarchy: deep core, policy core and secondary beliefs. Deep core beliefs represent fundamental values and axioms that transcend specific policy areas, policy core beliefs are specific to a policy subsystem's scope, reflecting core orientations and value priorities, and secondary beliefs pertain to the instrumental methods to achieve policy goals (Sabatier, 1988, 1998; Jenkins-Smith et al., 2018) (see Table 1).

Originally, ACF emphasized the congruence of belief systems as being the main driver for coordination (Sabatier, 1988). Although this remains an essential factor, recent literature suggests that various other elements also play significant roles in enabling or impeding coordination (Weible et al., 2020). These aspects will be further examined in the subsequent results section of our review.

TABLE 1 Differentiation between deep core beliefs, policy core beliefs and secondary beliefs, based on Sabatier (1998) and Jenkins-Smith et al. (2018).

Belief type	Description
Deep core beliefs	Represent fundamental values and axioms that transcend specific policy areas.
Policy core beliefs	Are specific to a policy subsystem's scope, reflecting core orientations and value priorities.
Secondary beliefs (also called secondary aspects)	Pertain to the instrumental methods to achieve policy goals.

2.3 Why the advocacy coalition framework can provide insights to understand transition processes?

The study of policy systems through an ACF lens can provide insights for transition studies because the processes that are looked at in their respective systems are comparable in relation to three foundational structures: (1) the role of collective action to drive institutional change, (2) the role of framing to define policy problems and policy solutions, and (3) the role of resources that influence the success of driving institutional change.

First, socio-technical transitions materialize as a consequence of regime change. Regimes represent the "institutional grammar" of socio-technical systems (Geels, 2004; Fuenfschilling and Truffer, 2014). This grammar includes "highly institutionalized, but not necessarily coherent formal and informal rules" (Fuenfschilling and Truffer, 2014, p. 773). While formal rules relate to laws, policies and regulations, informal rules relate to, for example, norms, values and habits (Scott, 1995). Whereas institutional change in transition studies includes the change of formal and information rules (Verbong and Geels, 2010; Kemp and van Lente, 2011), the ACF focuses on policies as a specific type of formal rule that structures policy subsystems. Nevertheless, despite their differences, both system types see similar processes: actors use collective action to gain political influence and modify formal institutions, leading to regime change and the creation of favorable conditions for sustainable innovations.

Second, as system change is always uncertain, potential problems and solutions that remedy those problems need to be framed and articulated by actors in order to gain traction. This is the case in socio-technical systems as well as in policy subsystems. Therefore, policy process theories that explicitly include framing and cognition can be particularly beneficial for transition studies (Markard et al., 2016). The ACF is one such approach because "it argues that the ideas actors hold matter in terms of the direction of policy change they seek" (Kern and Rogge, 2018, p. 104).

Third, in transition studies, as well as in the ACF, resources are a key element that influence the materialisation of policy change. For example, in transition studies, the "coordination of resources available inside and outside the regime" is seen as crucial for regime change (Smith et al., 2005; Geels and Schot, 2007, p. 400). Furthermore, in the Technological Innovation System (TIS) approach, financial resources, public opinion and legitimacy are seen as key functions for the diffusion of more sustainable solutions (Hekkert et al., 2007). This is very similar to how the role of resources is understood in the ACF, whereby financial resources, information, public opinion and legal authority are seen as aggregated in coalitions that increase the influence to change policy (Weible et al., 2020).

Given its broad range of foundational structures and applications, we expect—similar to Markard et al. (2016)—the ACF to be a highly relevant framework to shed light on fundamental processes that play out in a broad variety of socio-technical transition cases, and thus be able to inform transition studies. Haar and Pierce. (2021) further extend the applicability of the ACF by demonstrating its relevance in explaining foreign policy changes, highlighting its utility across diverse policy domains beyond socio-technical transitions.

Echoing these similarities and complementarities, the Sustainability Transitions Community has started to integrate more policy process research into transition studies. Recent literature, including case studies by Ulmanen et al. (2015), Haukkala (2018), and Ocelík et al. (2019), have applied the ACF to unpack complex advocacy dynamics within sustainability transitions. Löhr et al. (2024) also explore coalition formation in a nascent policy subsystem, examining the case of hydrogen technologies in Germany, which reveals the influence of actors' sectoral backgrounds, technology characteristics, and trust on coalition development. Subsequent scholarship has ventured into the modelling of advocacy coalitions (Gottschamer and Zhang, 2020) and theoretical expansion (Markard et al., 2016; Gomel and Rogge, 2020; Schmid et al., 2020; Lindberg and Kammermann, 2021). For example, Markard et al. (2016) make suggestions about the interplay of socio-technical systems and policy systems, whereas Schmid et al. (2020) combine the ACF with policy feedback theory to conceptualize a complete feedback loop and suggest mechanisms to explain, with a specific focus on growth and decline of coalitions, why advocacy coalitions change over time. Furthermore, whereas Gomel and Rogge (2020) theoretically interlink the ACF with policy mixes and draw conclusions about how these influence transition, Lindberg and Kammermann (2021) contrast the relatively uncomplex findings from Ulmanen et al. (2015), Haukkala (2018), and Ocelík et al. (2019) by suggesting that, in advancing transitions, "coalitions can no longer be classified as either niche or regime" and that the "strictly for-or-against battlefields" are "becoming increasingly pluralized" (Lindberg and Kammermann, 2021, p. 274). Similarly, Kefeli et al. (2023) highlight the role of changing beliefs within advocacy coalitions in integrating nascent policy subsystems into mature ones, as seen in the case of environmental policy integration in Uruguay's forestry sector.

Furthermore, they suggest that "it is no longer the question of being for or against the transition" but instead "about the level of ambition, types of support policies, market design and the role of market mechanisms" (Lindberg and Kammermann, 2021, p. 274). These new findings, particularly those by Lindberg and Kammermann (2021), suggest that, although coalitions are rather easy to spot in the early phases of transitions, the field becomes more fuzzy or even messy over time. The interaction, coordination and alignment processes that occur, as well as how they influence the change of coalitions in terms of decline and growth in such systems, have not been analysed or well understood in transition studies. These studies underscore a shift from clear-cut coalitions to more intricate and dynamic groupings over time. Understanding how these coalitions form, evolve and affect policy change is an emerging focus within transition studies.

3 Method

3.1 Creation of corpus

Our first step towards a better understanding of coordination among actors in coalitions was to compile a comprehensive corpus of peer-reviewed journal papers. We used the Web of Science database and the Scopus database to generate a list of journal papers (June 2020). We used both databases, as they are congruent to a large extent, although each still exclusively lists certain publications. To be eligible for inclusion in our corpus, documents had to be written in English. They had to be peer-reviewed, and they had to mention the term "advocacy coalition" in the title, abstract or keywords. As Sabatier published the first paper on the Advocacy Coalition Framework in 1988, only papers published between 1988 and June 2020 were eligible for inclusion. The search term produced 618 hits in the Web of Science database and 590 hits in the Scopus database. To obtain clean data, we eliminated duplicates and matched the titles of the papers from the two databases by calculating Levenshtein distances (Levenshtein, 1966) using R software. The Levenshtein distance between two strings is defined as the minimum number of insert, delete and replace operations to convert the first string to the second. Based on Levenshtein distance calculations (a maximum of 10 single-character edits, and hand matching the remaining non-matched documents by hand), the R software generated a single corpus of 742 documents.

It is important to note that our analysis is based on literature published up to June 2020. This cutoff was chosen to maintain consistency due to the extended review process that this manuscript has undergone. While more recent publications on the Advocacy Coalition Framework and sustainability transitions have undoubtedly added new insights, we believe that our selection still includes the core foundational and empirical work necessary to address our research questions. Nevertheless, we recognize that the exclusion of recent studies may limit the scope of our findings, particularly regarding very recent developments in ACF applications.

3.2 Reduction of corpus

To produce a corpus that included only documents dealing with the coordination of advocacy coalitions, we screened the titles, abstracts and keywords of all 742 papers. Furthermore, we used a basic text-mining approach to improve the decision on whether to include a paper in the reduced corpus. In order to accomplish this, we examined all 742 papers to determine the extent to which they addressed the following six terms: coordination, collaboration, cooperation, growth, stability and defection.

The terms "coordination," "collaboration," "cooperation," "growth," "stability," and "defection" were selected for their prominence in Advocacy Coalition Framework (ACF) literature. "Coordination," "collaboration," and "cooperation" are fundamental concepts that describe coalition interactions, while "growth," "stability," and "defection" reflect coalition dynamics over time. This selection was informed by key ACF works (e.g., Sabatier, 1988; Weible and Ingold, 2018; Weible et al., 2020), where these terms are central to coalition behavior and policy influence. We acknowledge that this approach may have omitted relevant articles using different terminology, but believe that our combined text-mining and manual screening captured the most critical contributions to our research question.

We not only mined for coordination but also for collaboration and cooperation, as these two terms also indicate coordinated behavior and are used interchangeably with the term "coordination" by some ACF contributing authors. Furthermore, we mined for growth, stability and defection to cover coalition.

A document was included in the initial corpus if the title, abstract or keywords indicated that the content of the document could be used to answer the research question or if one of the search terms appeared at least three times. The threshold was deliberately not chosen to be too high in order to avoid excluding documents that analyse coordination in depth. However, we assumed that if a document

mentioned only one of the search terms no more than three times, the probability of that document being relevant was quite low.

Following the mining and screening process, all papers in the initial corpus were classified in two main categories. The first category included all papers that dealt with the ACF in detail and that mentioned either coordination, collaboration, cooperation, growth, stability or defection at least three times. The second category included all documents that either (1) did not refer to the ACF but used a combination of "advocacy" and "coalitions" in the title, abstract or keywords, or (2) only referenced the ACF without including an in-depth ACF analysis. We focused on the first category to answer our research question. The category included 57 documents, which formed the core corpus.

3.3 Analysis of the core corpus and creating the final corpus

The initial step involved meticulously reviewing 57 papers, leading to the exclusion of 19 that were not pertinent to the research query, such as those focusing on policy stability instead of coalition stability, or those applying the ACF without generating relevant theoretical insights. Consequently, 38 papers remained. Through citation tracking in these papers, four additional papers were identified and included, despite not featuring "advocacy coalition" in their title, abstract or keywords. Furthermore, a seminal book chapter that deals with core concepts (Sabatier, 1993), as well as a conceptual book chapter concerning coordination, which was repeatedly cross-referenced in the corpus (Jenkins-Smith et al., 2014), and another empirical book chapter (Nohrstedt and Olofsson, 2016) were added to the core corpus. As a result, the final core corpus comprised 45 documents (Figure 1 and Appendix).

Of the 45 documents, 7 are of a conceptual nature and a further 3 are literature reviews. The remaining 35 documents are of an empirical nature, which illustrates how widespread the Advocacy Coalition Framework has become over the past three decades. Of these 35 documents, 13 deal with regional policy issues, 4 with policy issues at USA state level, 16 with policy issues at national level, and 2 with policy issues at a supranational level. Furthermore, the 35 documents cover 16 types of policy issues, as shown in Table 2.

Multiple entries of policy issues were possible. Although some empirical studies in our review may seem unrelated to sustainability transitions, such as those focusing on foreign affairs or higher education, their inclusion is intentional. By examining a broad array of systems, we aim to uncover common coordination and alignment challenges across different contexts. Despite their apparent detachment from material or technological aspects of sustainability, sectors such as foreign affairs and education are integral to sustainable development. Foreign affairs play a critical role in global climate and biodiversity negotiations, while education shapes future leaders and critiques unsustainable practices across research and infrastructure, including energy use, resource production and travel emissions.

The 16 issues covered were examined in seven countries (see Table 3).

In the analysis section, a number of examples from the empirical studies will be used to illustrate the theoretical findings of the review.

The final core corpus of 45 documents was analysed with MAXQDA software, guided by a code tree featuring six key terms relevant to advocacy coalition coordination: coordination, cooperation, collaboration, stability, defection and growth. In the analysis, emergent coordination-related topics were identified. Lexical searches were conducted to assess the prevalence of these topics and keywords across the core corpus, involving keyword frequency counts. Topics and insights recurrent across multiple authors were then incorporated into the findings.

4 Analysis: what influences the coordination of advocacy coalitions?

In this section, the analysis outcomes are detailed, highlighting several factors that influence coordination within the literature on the Advocacy Coalition Framework. These factors, often interconnected, are structured into five subsections (4.1–4.5) for clarity. A factor is included in a subsection if it is addressed in at least two of the analysed documents.

4.1 Prerequisites for coordination

Our first finding is that establishing contact between potential coalition partners is a basic prerequisite for coordination. The ACF literature suggests that organizations and individuals that are

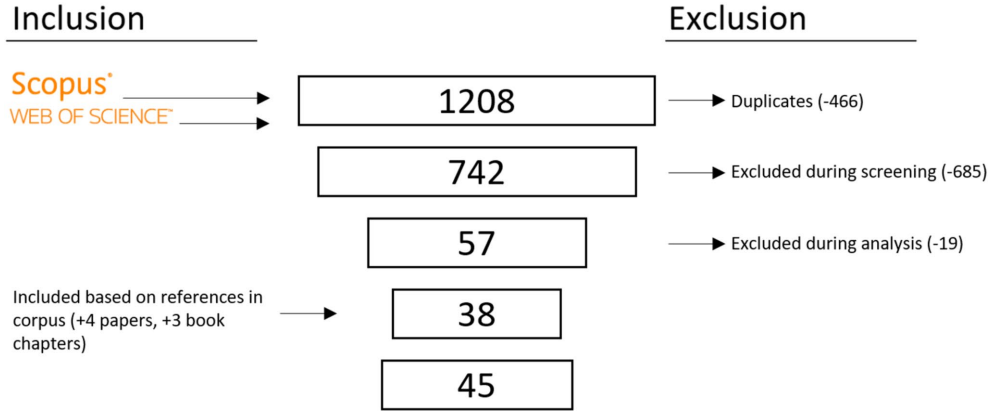

FIGURE 1
Compilation of corpus. The final corpus included 45 documents.

TABLE 2 Policy issues dealt with in the 35 empirical documents analysed.

Policy domain	Number of papers that touch on this domain
Marine and water policy	9
Energy policy	4
Climate policy	3
Fracking policy	3
Carnivore management policy	2
Forest policy	2
Pharmacy and drug policy	2
Water supply policy	2
Automotive pollution control policy	1
Foreign policy	1
Higher education policy	1
Land-use and transportation planning policy	1
Regional planning policy	1
Tobacco control policy	1
Trade union policy	1
Workplace safety policy	1

TABLE 3 Countries covered in the 35 empirical documents analysed.

Country	Number of papers	Policy domain
USA	17	Energy policy, Marine/water policy, Automotive pollution control policy, Water supply policy, Regional planning policy, Workplace safety policy, Fracking policy, Climate policy
Sweden	6	Forest policy, Fracking policy
Switzerland	5	Fracking policy, Climate policy, Pharmaceutical/drug policy
UK	1	Fracking policy
Germany	1	Energy policy
Netherlands	1	Marine/water policy
Mozambique	1	Higher education policy
Canada	1	Trade union policy
Denmark	1	Pharmacy/drug policy

politically active in the same policy subsystem first need to interact in order to cooperate or compete for political influence. However, demarcations of policy subsystems are not predefined, and actors may not be aware of all other actors in the same policy subsystem (Henry, 2011). This is further complicated by the fact that policy subsystems can span several geographical divisions, from local policy subsystems to national policy subsystems, to policy subsystems on a transnational or even global level. For example, the documents that cover the different spans of policy subsystems include one by Matti and Sandström (2011), who look at carnivore management at local county level in northern Sweden, and one by Wray et al. (2017), who look at the global tobacco policy subsystem. These scholars suggest that different types of interdependencies and brokers influence whether and how policy actors interact. Interdependencies exist when the room for maneuver of one actor is influenced by one or more other actors. When actors compete for a resource, they find each other in what Fenger and Klok (2001) a competitive interdependency. If they find each other in a situation "where one actor's actions contribute to another actor's actions or goal achievement," they find each other in a symbiotic interdependency (Fenger and Klok, 2001, p. 160). Regardless of whether actors find themselves in competitive or symbiotic interdependencies, such interdependences arise either when actors are naturally or artificially related to one another.

A natural interdependence means that actors' activities "are causally related to each other" (Fenger and Klok, 2001, p. 160). The debate on the outer continental shelf oil and gas leasing that emerged in the USA at the end of the 1960s is an example of a frequently cited causal relationship (natural interdependence) (Jenkins-Smith et al., 1991; Fenger and Klok, 2001). After an oil spill off the coast of Santa Barbara, coastal residents and environmental groups began coordinating action against further oil drilling and leasing of exploitation rights. Before the oil spill, these groups had rarely interacted, but the oil spill was the cause that brought them together to coordinate their actions against a common opponent. Another example of a natural interdependency can be found in a paper by Meijerink (2005), which describes the emergence of a coalition

between fishermen and environmentalists in the Netherlands to counter policy proposals that supported coastal protection after a storm surge but that would also threaten local fishing populations. Actors are likely to interact and start coordinating when they are artificially connected (Zafonte and Sabatier, 1998).

An artificial interdependence is present when "some external actor (e.g., the legislature) has linked their activities for some purposes of its own" (Fenger and Klok, 2001, p. 160). Calanni et al. (2015, p. 909) cite marine aquaculture partnerships as an example of artificial interdependence. The partnerships were "created through legislative mandate" to bring policy actors together "with the purpose of addressing concerns regarding fish health, public safety, and other issues relating to the expansion of the aquaculture industry" (Calanni et al., 2015, p. 909). Additionally, initial contact can be established by internal coalition brokers,[1] who introduce actors to each other and thereby create the seed beds for coordination and coalition building (Sabatier, 1993; Weible, 2008; Henry et al., 2011; Weible et al., 2011a; Ingold and Fischer, 2014), or by previously existing mobilising structures (Kübler, 2001). Once coordination has been established, they "keep multiple actors working toward common goals" (Sabatier, 1993; Henry et al., 2011, p. 422). However, it is not very clear from the literature to date how and why actors take on the role of internal coalition brokers.

4.2 Reasons to coordinate: belief homophily and its potential moderators

4.2.1 Shared beliefs

One of the key assumptions of the ACF is that when actors become aware that they are active in the same policy subsystem, the *belief homophily hypothesis* will explain their coordination. The hypothesis suggests that overlapping beliefs act as the "principal glue" among coalition members (Sabatier, 1988, p. 141). Following this, it is assumed that coordination would increase with belief congruence, and that conflict would increase with belief divergence (Zafonte and Sabatier, 1998). As deep core beliefs are not specific to a policy subsystem and secondary belief preferences may not last over long periods, it has been suggested by Weible et al. (2009) and others that policy core beliefs are most important for predicting coordinated activity.

Over the years, the belief homophily assumption has been repeatedly supported in a number of studies (Zafonte and Sabatier, 1998; Weible, 2005; Weible and Sabatier, 2005; Henry, 2011; Matti and Sandström, 2011, 2013; Nohrstedt and Olofsson, 2016). However, following initial criticism by Schlager (1995), the idea that similar core policy beliefs are the only reason for actors to coordinate has been contested. Schlager's key argument was that beliefs may have an influence but are not sufficient to explain coordinated behavior. Instead, she called for a more adequate explanation of "why actors holding similar beliefs form coalitions to collectively press their policy goals" (Schlager, 1995, p. 244).

Over the past 30 years, ACF-based studies have predominantly pursued evidence that belief congruence directly predicts coordination, but the most recent decade has seen a shift towards exploring other explanatory factors for coordinated behavior, offering two key insights beyond belief homophily.

First, research in the past 10 years has begun to question the assumption that shared beliefs necessarily lead to coordination. Henry (2011) reported that, in California, shared beliefs among policy elites did not significantly influence coordination in regional land use and transportation planning. In Sweden, a social network analysis by Nohrstedt and Olofsson (2016) on hydraulic fracturing showed that, despite widespread agreement against fracking expansion, only fragmented coordination clusters formed, not a cohesive coalition, which led to the conclusion that the actors were "too fragmented to speak of one single dominating anti-fracking coalition" (Nohrstedt and Olofsson, 2016, p. 155).

Second, the context of policy subsystem contestation has been identified as a factor affecting the role of shared beliefs in coordination. Weible et al. (2018, p. 3) describe contested subsystems as arenas where policy actors have divergent positions and a low willingness to compromise. In such environments, as demonstrated by Calanni et al. (2015), belief homophily is seemingly less predictive of coordination. Their study on marine aquaculture in the USA found that, even with differing beliefs among actors, collaboration still occurred in the less contested policy spaces due to a shared objective for development. This suggests that coordination can extend beyond belief similarity, as in the partnerships of governmental and non-governmental groups in marine aquaculture, which were able to collaborate despite differing belief systems (Calanni et al., 2015, p. 908).

4.2.2 Level of contestation

Recent attention has focused on how the level of contestation within a policy subsystem moderates the predictive power of shared policy beliefs for coordination. Weible et al. (2018) examined a highly contested subsystem involving fracking in New York, Colorado and Texas, with active coalitions on both sides. They describe the political climate as one of "broad mobilization from diverse policy actors" (Weible et al., 2018, p. 9), signaling intense controversy. They found that in the contested fracking subsystem, shared beliefs were deemed to be only moderately important. Their findings support the notion that policy beliefs are still relevant in explaining coordination in such contentious contexts, but are less likely to be relevant in less contested subsystems, which aligns with findings by Calanni et al. (2015). Although these findings are interesting, they also raise new questions, such as where the line between a highly and a minimally contested subsystem is to be drawn. The differentiation between a contested and a non-contested policy-subsystem remains under-defined.

4.2.3 Trust

Along with belief homophily, trust has been proposed as another moderator affecting coordination. While some researchers, such as Fidelman et al. (2014) and Calanni et al. (2015), see it as a precursor to coordination, others, such as Schlager (1995), Sabatier (1998), and Weible et al. (2009), view trust as emerging from coordination. Adding more nuance, Henry et al. (2011) suggest that trust is interrelated with belief homophily, finding that coordination stems not from shared beliefs per se but from when a trusted broker leverages connections, as they observed an "avoidance effect" where actors did not necessarily

1 Henry et al. (2011) use the term "policy brokers" to describe those who work within coalitions to find common ground. In this paper, however, we use "policy brokers" to describe brokers who negotiate policy agreements between several coalitions (as done in Sabatier, 1993), and we use the term "internal policy brokers" to describe actors who facilitate coordination within a coalition.

align with those holding similar beliefs but were brought together by brokers that were trusted by different actors (Henry et al., 2011, p. 411, p. 423). In essence, trust, like belief homophily, seems to have a significant influence on coordination, but its interrelation with belief homophily and with the level of contestation requires further exploration, and a consistent method to measure trust within the ACF framework has also seemingly not yet been established.

4.3 Instrumental factors that influence coordination

Beyond belief homophily and its moderators, the literature review indicates that various instrumental factors can also affect coordination, contributing to the growth and stability of coalitions or to defection. While advocacy coalitions are fundamentally associated with the belief homophily hypothesis, its explanatory limitations have been noted in 4.2, above. Recognising the following instrumental factors is crucial for a full understanding of coordination in advocacy coalitions. However, scholarly focus on these factors in the literature is not as extensive as that on beliefs, which means that many of the following theoretical propositions are insufficiently supported by empirical research.

4.3.1 Access to resources

In addition to the belief homophily argument, some authors have explored whether access to resources influences actors that are interested in coordinating with other policy actors (Weible, 2005; Henry, 2011; Matti and Sandström, 2011; Calanni et al., 2015; Elgin, 2015). They found evidence that access to resources has some explanatory value for coordination among actors. Access to resources is a central argument in organizational theory: "organizational survival hinges on the ability to procure critical resources from the external environment" and organizations aim to "reduce uncertainty in the flow of needed resources" by employing a variety of tactics and strategies (Pfeffer and Salancik, 1978; Casciaro and Piskorski, 2005, p. 167). In the documents in the analysed corpus that deal with access to resources, the authors measure this access in a variety of ways. The resources considered include *financial resources* (Calanni et al., 2015; Weible et al., 2018), *access to expertise* (also called competence) (Calanni et al., 2015; Weible et al., 2018), *formal training* (Elgin, 2015), *capability to use collaborative and analytical tools* (Elgin, 2015), *organizational capacity* (Elgin, 2015) and access to people who were perceived to have political power (Weible, 2005; Henry et al., 2011; Matti and Sandström, 2011; Weible et al., 2011a; Calanni et al., 2015; Weible et al., 2018). All but one of the cited studies (Matti and Sandström, 2011) find that access to resources helps to explain coordination among individuals. However, it should be pointed out that none of the documents focuses solely on access to resources; rather, it is always considered alongside other elements. For instance, Calanni et al. (2015), Henry (2011), and Weible et al. (2018) explore resource access in relation to belief homophily. Although these studies acknowledge the potential of resource access to influence coordination, they consistently deem its explanatory power as being of secondary importance. In general, access to resources seems to be a contributing factor in explanations of coordination. However, as indicated above, its explanatory power is likely to be limited and requires further research.

4.3.2 Prioritizing organizational welfare

Political actors, part of pressure groups aiming to influence policy, require resources such as funds and manpower (Elliott and Schlaepfer, 2001a, 2001b). Such resources may fluctuate due to external events such as economic changes, shifts in public opinion or political realignments (Elliott and Schlaepfer, 2001b, 2001a; Zafonte and Sabatier, 2004). These events can bring about both beneficial and detrimental impacts, although the literature often focuses on the negatives, such as financial restrictions at the organizational level, leading to broader resource scarcities. To continue their advocacy work, group members must weigh their organization's well-being against their coalition's needs. "Interest […] in maintaining and increasing their own viability/welfare" becomes paramount (Sabatier, 1998, p. 1166). Faced with limited resources, there is a tendency for actors to favor their organization's interests, which may result in departing from their coalition (Sabatier 1998).

4.3.3 Wish for increased political influence

Not all members of coalitions are equally engaged in furthering the coalition's goals. Weible et al. (2010, p. 524) suggest that coordination and allegiance to a coalition depend on the "centrality of a given issue to the members' belief system and to the members' access to resources." Based on their level of allegiance, coalition members can be classified as principal or peripheral members (peripheral members are sometimes also called auxiliary members) (Zafonte and Sabatier, 2004; Weible et al., 2010).

Larsen et al. (2006) show that core actors are more likely to remain loyal to the coalition, while actors at the periphery may join other coalitions if that helps them to increase their political influence. A possible explanation is that the cohesion of core members is stronger due to their shared core policy beliefs, whereas peripheral coalition members are mainly linked by shared secondary beliefs (Nohrstedt, 2010, p. 316).

4.4 Composition of coalitions and their internal organization

Coordination is influenced not only by factors that motivate or demotivate actors to coordinate but also by the composition of coalitions and the ways in which coalitions are organized. Findings relating to these factors are presented in the following subsection. Similarly, with regard to the instrumental factors, the scholarly attention in the ACF literature seems to have been rather limited.

4.4.1 Heterogeneity among coalition members

One of the tenets of the Advocacy Coalition Framework is that coalitions are composed of diverse actors from different backgrounds and with different professions (Sabatier, 1998). This assumption is repeatedly supported in empirical studies (e.g., Elgin, 2015; Nohrstedt and Olofsson, 2016; Cohen et al., 2018). However, this raises the question of whether heterogeneity affects coordination among coalition members. Schlager (1995) suggests that, on the one hand, heterogeneity could present an obstacle to cooperation, as actors are likely to feel that they are not treated fairly and thus may be more likely to defect, while on the other hand, heterogeneity is likely to bring to a coalition resources that are more diverse, which may benefit the coalition's political struggle. The analysed literature shows

evidence of the latter (e.g., Cohen et al., 2018), but the former area of inquiry is seemingly under-researched. This identified gap in the literature is in line with findings reported by Weible et al. (2020, p. 1069), namely that the effects of diversity in coalitions is an area where research is still needed.

4.4.2 Internal processes and organization of advocacy coalitions that influence stability

In addition to claiming that heterogeneity influences coordination within coalitions, Schlager (1995, p.250) suggests that coordination within coalitions can be compromised by the high costs of "information exchange and shaping preference" among heterogeneous members. Trust deficits and disproportionate internal power dynamics, stemming from the varied resources that members contribute, also impede coalition efficacy. Schlager suggests that coalitions encourage regular interactions to reduce these costs and build trust, citing Ostrom (1990) who notes that the repetition of interactions "decreases the cost for information exchange and shaping preferences" and "allows actors to learn that other actors are trustworthy" (Schlager, 1995, p. 250). Additionally, she proposes the use of sanctions to prevent defection, and advocates for equitable, not equal, treatment to ensure the internal power balance (Schlager, 1995, p. 250, pp. 262–263). She advises giving greater decision-making power to those who contribute more resources, believing that it is advisable for the coalition to give such members more say in the coalition's setting of goals and strategy (Schlager, 1995, p. 163). Although Sabatier (1998) conceptually supports regular interaction, and Lubell (2007) provides some empirical evidence for the benefits of equitable treatment, the evidence base for the efficacy of Schlager's suggestions is not yet robust, which highlights a gap in the research.

4.5 Coordination over time

Thus far, Section 4 has displayed factors that directly impact coordination at any given point in time. However, this ignores the evolving nature of coordination and coalition-building throughout different stages of struggles over policy development. Therefore, this subsection summarises the insights gained from the literature review concerning what determines the dynamics of coordination.

4.5.1 Coordination in nascent and mature policy subsystems

The ACF literature suggests that the context for coordination in policy subsystems changes over time. Authors differentiate between nascent and mature policy subsystems. According to Jones and Jenkins-Smith (2009), a nascent policy subsystem is defined by three characteristics. First, "participants regard themselves as a semiautonomous community who share a domain of expertise" (Jones and Jenkins-Smith, 2009, p. 44). Second, "there exist specialized units within relevant governmental agencies to deal with the policy of interest" (Jones and Jenkins-Smith, 2009, p. 44). And third, "there exist interest groups, or specialized subunits within interest groups, that regard this as a major policy topic" (Jones and Jenkins-Smith, 2009, p. 44). In contrast, in a mature policy subsystem, "participants have sought to influence public policy within the domain over a fairly long period of time (i.e., 7 to 10 years)" (Jones and Jenkins-Smith, 2009, p. 44).

The review shows that the relevant literature is quite limited. Nevertheless, the papers that deal with advocacy coalitions in nascent policy subsystems highlight some differences between mature and nascent subsystems.

In nascent policy subsystems, actors' policy preferences and beliefs are not yet well defined and are somewhat fluid (Ingold et al., 2017). Therefore, it is more difficult for them to identify their ideological peers (Ingold et al., 2017, p. 458), and the belief homophily may not be as salient as in mature policy subsystems. As a result, it is likely that several coalitions will emerge in nascent policy subsystems (Stritch, 2015), and that trust and previous contacts will play a bigger role than belief homophily (Jenkins-Smith et al., 2018). Given that, by definition, nascent policy subsystems are still emerging, coordination is not yet widespread, and coalitions have not had sufficient time to become established. Consequently, subsystem politics are likely to be influenced by *coalitions of convenience* (Jenkins-Smith et al., 2018) or *advocacy communities* (Stritch, 2015), which are also called *ephemeral coalitions* (Weible et al., 2020). Furthermore, coordination in nascent policy subsystems is likely to still be weak (Beverwijk et al., 2008).

4.5.2 Coordination dynamics in policy subsystems

Examining coordination patterns in nascent and mature policy subsystems implicitly suggests that policy subsystems always start by being nascent and then develop towards maturity. This view, however, misses the fact that new coalitions may form at any time, including in mature policy subsystems, which can, for example, be spurred by external events (Weible et al., 2020). This subsection provides an overview of these dynamics as documented in the literature.

In the Advocacy Coalition Framework (ACF), advocacy coalitions are situated within policy subsystems, which can vary greatly. The review indicates that these subsystems can be categorized into three types: unitary, collaborative and adversarial (see Figure 2). The literature also suggests that interaction and coordination patterns differ across these subsystem types. In the following, we will describe these three archetypes of policy subsystems and their respective coordination patterns.

Unitary subsystems: Unitary subsystems are characterized by a dominant coalition that includes the majority of political actors with ample resources to guide policy and weaken any opposition, which is typically scattered and under-resourced (Weible et al., 2010). This dominant coalition favors incremental changes to preserve the status quo, mitigating events that might attract outside attention, and circulating benefits within its own ranks (Weible, 2008). Learning is confined within the coalition, reinforcing existing beliefs (Weible et al., 2010), with coordination limited to within-group actors. While the Advocacy Coalition Framework (ACF) recognizes both major and minor policy changes (Sabatier, 1998), in unitary systems, the dominant coalition is well-positioned to enact major policy changes but is less inclined to do so the longer it holds power (Fischer, 2014).

Collaborative subsystems: Collaborative subsystems comprise several coalitions that "continue to disagree but […] are able to find enough common ground to negotiate" (Weible et al., 2010, p. 527; Fidelman et al., 2014). These coalitions are marked by extensive coordination both within and between groups, often facilitated by policy brokers, including *inter-coalition brokers* (Weible et al., 2010; Koebele, 2019). Such subsystems are generally less contentious, and

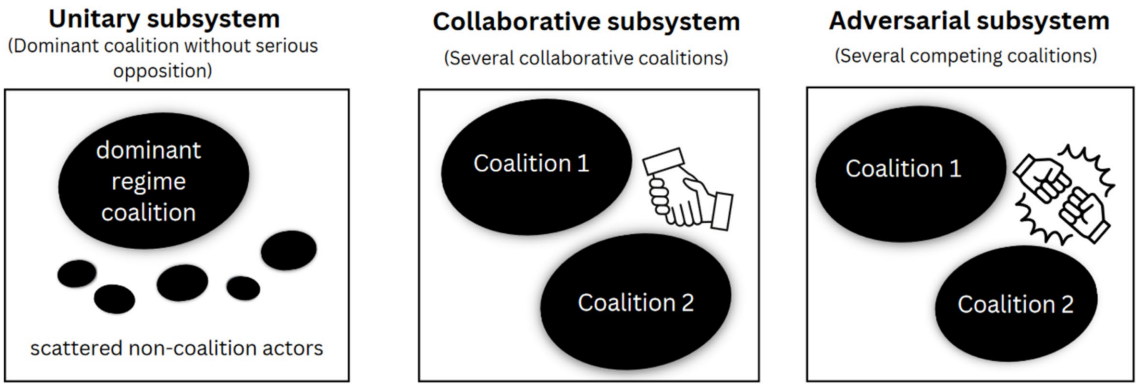

FIGURE 2
Three different types of policy subsystems.

similarity in beliefs does not necessarily predict coalition alignment, as in other subsystem types (Koebele, 2019). Actors "will coordinate for a variety of reasons other than holding shared beliefs, leading to a line-up of allies and opponents that varies over time" (Koebele, 2019, p. 51). Additionally, coordination across coalitions can be both "strategic and short-lived" as well as enduring (Koebele, 2019, p. 51). Authority in these subsystems is decentralized, with actors sharing access and often seeking "win-win and voluntary solutions" (Weible and Sabatier, 2009, pp. 197–198; Weible et al., 2011b, p. 500; Koebele, 2019). Collaborative subsystems allow for both major and minor policy changes, facilitated by regular interaction that promotes trust and learning (Fischer, 2014). However, there is a risk of inaction, as consensus-driven processes might lead to agreement without altering entrenched value-based positions (Weible et al., 2009).

Adversarial subsystems: Adversarial policy subsystems are "marked by high levels of conflict" (Weible et al., 2009, p. 135) and by a few competitive advocacy coalitions with "polarized beliefs" (Weible and Sabatier, 2009, p. 197). Coordination tends to occur internally within coalitions, and cross-coalition cooperation is rare (Weible and Sabatier, 2009). Coalitions in such subsystems usually prefer policies that create clear winners and losers, as opposed to compromise (Weible, 2008). Each coalition typically has enough resources to challenge its adversaries (Weible et al., 2010). In these subsystems, authority may be divided, with public servants or government organisations often aligned with a particular coalition (Weible and Sabatier, 2009). Unlike collaborative systems, adversarial coalition members rarely meet face-to-face, with interactions occurring at formal venues such as court or parliamentary hearings (Weible et al., 2011b). They tend to favor coercive policies over collaborative ones (Weible, 2008). When seeking change, coalitions might attempt to broaden conflict to include supportive outsiders, while those defending the status quo try to limit such escalations (Weible, 2008). Interaction between coalitions can manifest as a balance or imbalance of power. Equal power often results in a "hurting stalemate," where no substantial policy change occurs (Weible and Sabatier, 2009, p. 198; Ingold, 2011). However, when power is unequal, the dominant coalition may enforce major policy shifts without significant concessions (Fischer, 2014).

While these archetypes have been applied and refined over time (Weible, 2008; Ingold, 2011; Calanni et al., 2015; Weible et al., 2018), the analysed literature indicates that policy subsystems are not static in their classification. For instance, Weible et al. (2011b) demonstrated in their longitudinal study of water and land policy in the Lake Tahoe Basin, USA, that the subsystem transitioned from an adversarial to a collaborative type from the 1980s to the 2000s. This suggests that policy subsystems are capable of evolving over time.

5 Discussion: coordination across socio-technical transition phases

This section will discuss the insights from the literature review with regard to how they can inform sustainability transition theory. To illustrate the potential role of advocacy coalitions in transitions, we divide the process into four phases, following a suggestion by Geels (Geels et al., 2017; Geels, 2019; Geels and Turnheim, 2022) and building on Rotmans et al. (2001) (see Figure 3, Geels and Turnheim, 2022, p. 11). The phases along which the role of advocacy coalitions will be discussed are the experimentation phase, the niche stabilization phase, the disruption of the regime and innovation diffusion phase, and the institutionalization of the new regime phase (see Figure 3). While we acknowledge that any categorization of phases is likely to be somewhat arbitrary, we suggest using this categorization instead of, for example, the categorization into three phases by Schaltegger et al. (2023), as using four phases allows for greater nuance. The insights from the review will inform the development of a typology that describes the dynamics and patterns attributed to the four phases.

Sustainability transitions are multidimensional and nonlinear processes, and each transition is therefore unique (Markard et al., 2012). However, in an effort to categories general patterns of transitions, Geels and Schot (2007) outlined five distinct transition pathways. These include the transformation path (P1), the de-alignment and re-alignment path (P2), the technological substitution path (P3), the reconfiguration path (P4) and the sequential path (P5). As this paper marks only the beginning of the exploration of the role of advocacy coalitions and their coordination dynamics in socio-technical transitions, we will focus on two pathways. Firstly, the technological substitution pathway, as it describes the most archetypal process of a sustainability transition, where an unsustainable regime is being substituted with radical sustainable innovations in a socio-technical system that is under considerable landscape pressure. Secondly, adding more nuance, we will also relate to the reconfiguration

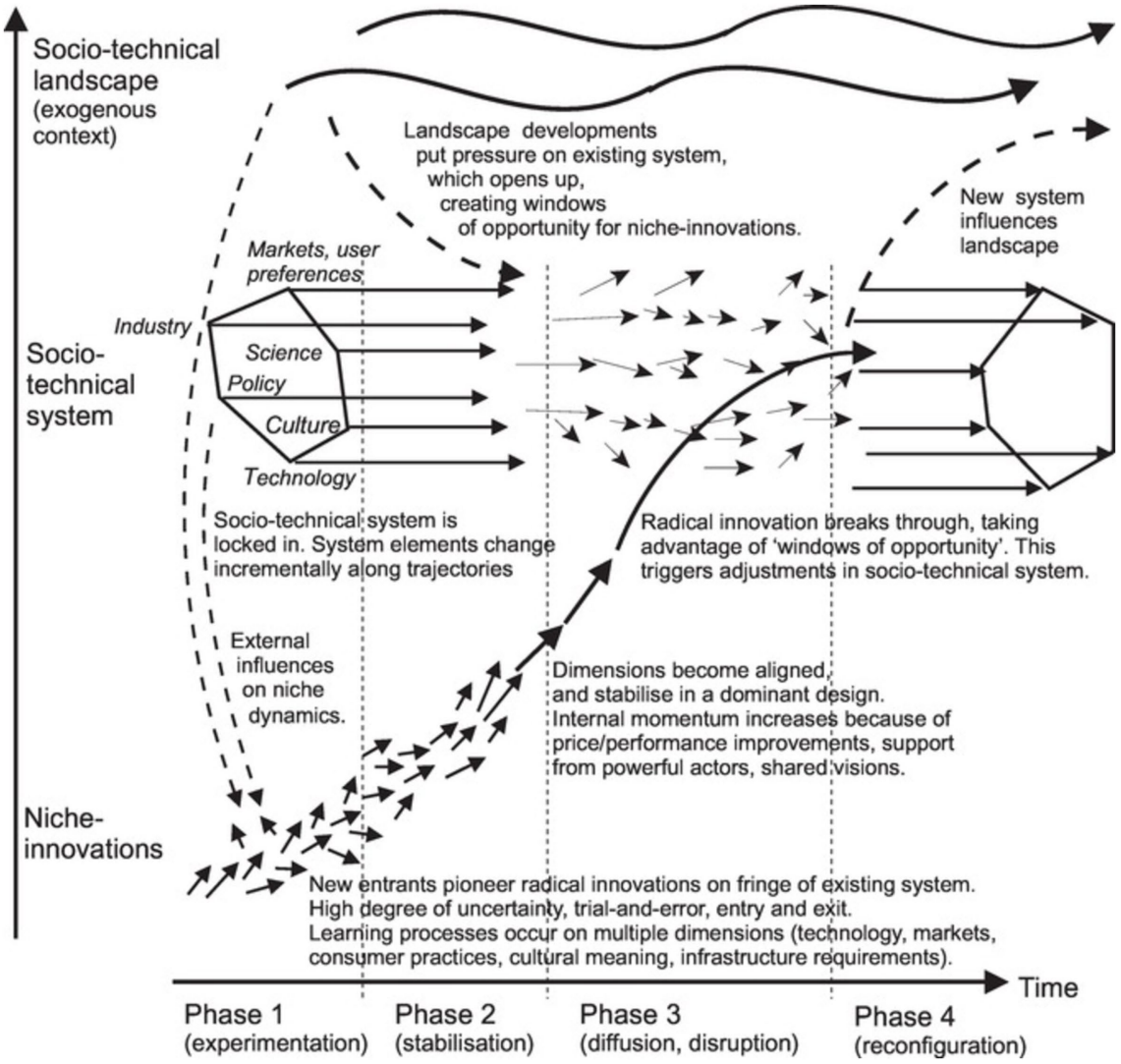

FIGURE 3
Multi-Level Perspective including four phases of on socio-technical transitions (Geels and Turnheim, 2022, p. 11; substantially adapted from Geels, 2002, p. 1263).

pathway, which is a pathway in which innovations that are more symbiotic to regime configurations are eventually adopted into the prevalent regime under low or no levels of landscape pressure (Geels and Schot, 2007). Based on these insights, we suggest that the evolution of coalitions unfolds along two specific pathways within these socio-technical transitions. The first is the technological substitution pathway, where coalitions compete with each other, creating an adversarial policy subsystem. The second is the reconfiguration pathway, where coalitions collaborate, fostering a collaborative policy subsystem. These pathways will be elaborated upon in the following sections. For a visual depiction, please refer to Figure 4.

5.1 Phase 1: coalition emergence in the experimentation phase

In the first transition phase, radical innovations emerge in niches as a result of experimentation on the fringes of existing regimes (Geels et al., 2017). This phase is characterized by experimentation and trial-and-error learning with radical niche innovations, where R&D laboratories, real-world experiments and demonstration projects serve as tangible platforms for these innovations. Consequently, this initial phase is marked by significant uncertainty, conflicting claims, numerous promises and a high incidence of failure.

Actors who will eventually become members of advocacy coalitions are likely to start as scattered entities within a unitary subsystem (Weible, 2008; Ingold, 2011; Calanni et al., 2015; Weible et al., 2018) that is embedded in the focal socio-technical system. In such a unitary subsystem, a dominant regime coalition interested in preserving the status quo exercises nearly all political power. Actors who may eventually form advocacy coalitions are not yet likely to be aware of each other's existence. Only over time do they become more aware of one another and begin to form bonds (see Ingold et al., 2017, p. 458). In this time of fluid connections, it is not predetermined that a single coalition will emerge; several may appear (see Stritch, 2015). In this phase, the role of intra-coalition brokers is crucial for

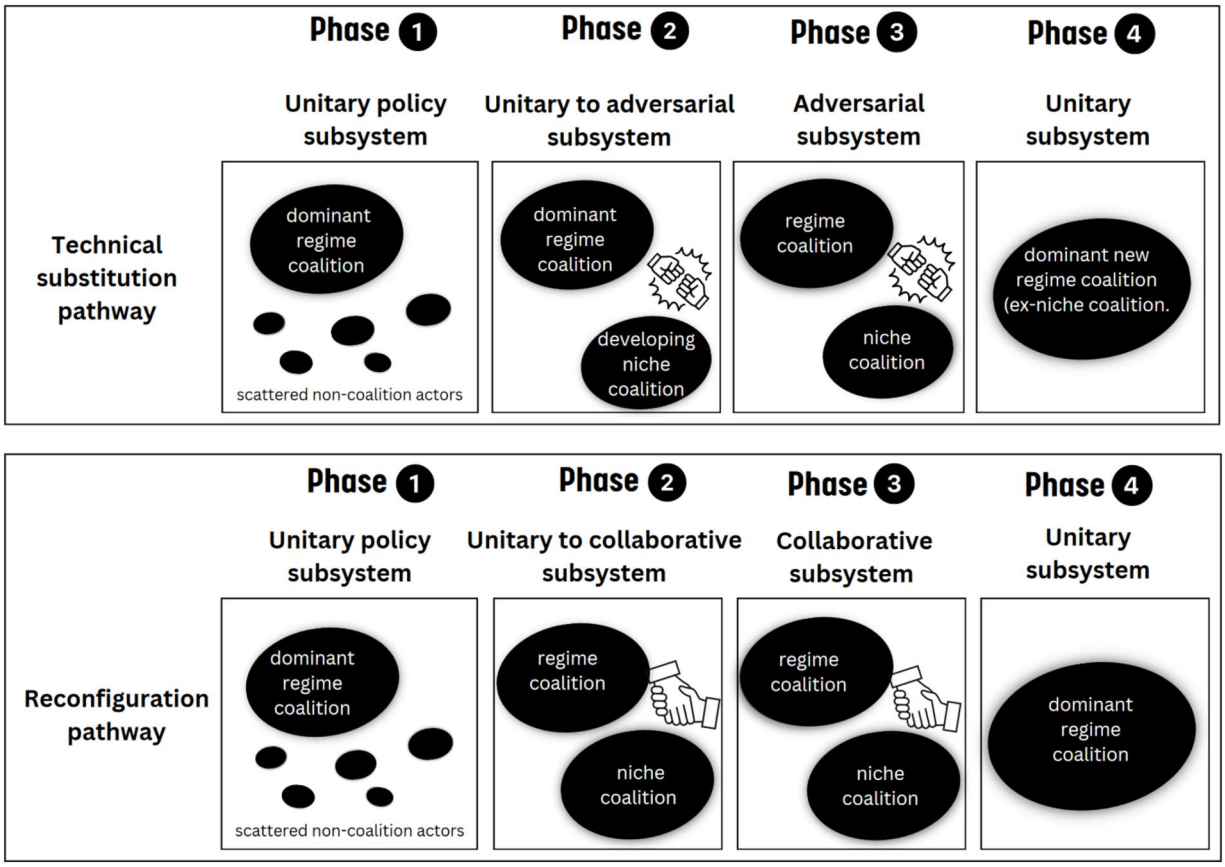

FIGURE 4
Coalition evolution along two pathways across the four phases of socio-technical sustainability transitions and its implications for changes in policy subsystems structures.

connecting niche actors and building bonds among them (see Weible et al., 2010; Koebele, 2019), akin to the tasks of the niche intermediaries introduced by Kivimaa et al. (2019). To identify and connect potential advocacy coalition members, brokers can leverage natural and artificial interdependencies (see Calanni et al., 2015; Fenger and Klok, 2001).

5.2 Phase 2: coalition consolidation during niche stabilization

In the second phase, inventions evolve into innovations that are shielded in small market niches, providing resources for further development and refinement (see literature on Strategic Niche Management, Smith and Raven, 2012). These innovations establish their own trajectories, with a dominant design emerging as expectations and associated rules begin to stabilize. Positive cultural visions play a crucial role in legitimizing these innovations, although they may face opposition from social groups due to negative side effects or a perceived lack of consultation, as observed with biofuels, onshore wind turbines, and carbon capture and storage in some countries (Geels et al., 2017).

Niche actors recognize each other and start forming bonds, leading to the formation of an advocacy coalition. The coalition gains media visibility, and its members strive to build direct links to policymakers. As their visibility and trust increase, they use their newfound leverage to harness broader trends, such as climate change or loss of biodiversity, framing societal or environmental issues as consequences of the current regime's practices. Alongside highlighting problems, they promote alternative solutions, articulate expectations of niche innovations, and construct and advocate positive visions (Budde et al., 2012; Weber and Rohracher, 2012; Kriechbaum et al., 2018). By gaining an edge in the narrative and discourse, they begin to destabilize the unsustainable regime structures. Early policy changes that protect niche innovations may appear, but these coalitions are not yet likely to wield significant political power. At this stage, regime coalition representatives start to actively acknowledge the emerging niche coalition, using their influence to entrench a discourse that stigmatizes the niche innovations as inadequate to meet the needs that are currently met by regime configurations.

Members of the niche coalition are faced with a strategic decision: escalate contestation or maintain a lower level of it. The literature indicates that, in subsystems characterized by high contestation levels, coordination tends to be congruent with shared policy beliefs (Weible et al., 2018). Consequently, actors in these contested subsystems usually coordinate within their coalitions, with limited cross-coalition interactions. In contrast, in subsystems with lower levels of contestation, there is a propensity for actors to coordinate across coalitions (Calanni et al., 2015).

Depending on their strategic assessment of the socio-technical landscape and their goals, niche actors might choose to increase or reduce contestation levels. If niche innovations are not compatible with the preexisting regime, niche actors may opt for increased contestation. Then the substitution pathway is followed, which leads to distinct and competing coalitions with reduced cross-coalition coordination, morphing the policy subsystem into an adversarial one. Alternatively, if the innovations are complementary, niche actors may preserve a low level of contestation to facilitate policy dialogue across coalition boundaries. This approach fosters inclusivity and garners broader support for policy proposals, thereby enabling the pursuit of the reconfiguration pathway and the transformation of the policy subsystem into a collaborative model.

Should niche promoters escalate contestation levels, adhering to the substitution pathway, the literature suggests that professionalization and the establishment of structured internal processes can be valuable (Schlager, 1995). These processes should encourage frequent interactions among coalition members to build trust and enable efficient information exchange. Furthermore, implementing sanction mechanisms and defining rights and duties for coalition members based on their resource contributions are also recommended (Schlager, 1995).

5.3 Phase 3: battling the regime coalition in the disruption of the regime and diffusion of innovation

In the third phase, the prevailing regime is destabilized due to intensifying external landscape pressures that can no longer be ignored. Concurrently, innovations become more cost-effective and widely accepted, reaching a point where they start to challenge the established regime's technologies and practices head-on. This shift is driven by several factors within the niche, such as enhancements in price/performance ratios, the capitalisation on economies of scale, ongoing learning, the expansion of supportive technologies and infrastructures, the emergence of favourable cultural stories, and the support of key influential actors (Geels and Schot, 2007).

The niche advocacy coalition has achieved a substantial level of organizational maturity, enabling it to extend and fortify its networks and access influential spheres of political power. For the first time, it is not about building an advocacy coalition but about maintaining it and keeping it running. To maintain the health of a coalition, the review suggested a number of instrumental factors. These include giving coalition members access to resources such as financial support (Calanni et al., 2015; Weible et al., 2018), expertise (also called competence) (Calanni et al., 2015; Weible et al., 2018), training opportunities (Elgin, 2015) and access to people who were perceived to have political power (Weible, 2005; Henry, 2011; Matti and Sandström, 2011; Calanni et al., 2015; Weible et al., 2018). Furthermore, as welfare concerns can lead to defection from coalitions (Sabatier, 1998), potentially resulting in the loss of political power, coalition members and brokers in socio-technical systems should strongly strive to pre-empt defection based on organizational welfare concerns. Accordingly, they should aim to explore ways in which actors can continue to be part of the coalition, even if, for example, their financial contribution is limited.

If the coalition had decided in Phase 2 to increase the contestation level, it would now aim to continue harnessing landscape pressures to shape discourses and further destabilize the regime. In such a situation, incumbents are likely to intensify their efforts to resist the emergent niche coalition and retain dominance over public discourse. Interactions within the subsystem exhibit turbulence; nevertheless, incumbents can still leverage established networks of power and financial dominance. Amidst these ongoing challenges, an increasing number of members within the niche coalition recognize the growing feasibility of realizing a substantive transition. As a consequence of their achievements, a bandwagon effect comes into play, facilitating the expansion of the niche coalitions in terms of their membership and impact. The subsystem has transformed into a fully adversarial policy subsystem.

If niche actors chose to keep the contestation level low and continue on the reconfiguration pathway, they will continue to disagree but will be able to find enough common ground to negotiate (Weible et al., 2010; Fidelman et al., 2014). Although intra-coalition brokers were needed in Phase 1, the inter-coalition brokers now organise collaboration between the incumbent and the niche coalition (see Weible et al., 2010; Koebele, 2019) aiming for a win-win solution (Weible and Sabatier, 2009, pp. 197–198; Weible et al., 2011b, p. 500; Koebele, 2019).

5.4 Phase 4: institutionalization of the new regime

The fourth phase is characterized by regime substitution, where the widespread adoption of new innovations triggers significant changes in infrastructures, policies, industrial and market frameworks, lifestyles and prevailing perceptions of what is considered normal (Geels et al., 2017). As the dated, unsustainable configurations are demanded less and are phased out, new incumbents emerge, and the new regime becomes firmly institutionalized and progressively regarded as a given.

In this phase, if the adversarial route and the substitution pathway were chosen, the once niche advocacy coalition that was pushing for the deployment of more sustainable configurations is likely to have evolved into a highly mature and institutionalized entity—so much so that it can no longer be considered a niche coalition but rather the new regime coalition itself. As a result, it will have become deeply interwoven within the policy structures of the focal socio-technical system. One of the most noticeable shifts in this phase is the network changes that have occurred. Lobby groups representing the old regime have lost their previous significance and access to power, while representatives from the new advocacy coalitions have now assumed influential roles within government-related positions and advisory committees. This increased interaction with policymakers enables the new advocacy coalitions to shape and influence policy decisions significantly.

If the collaborative route and the reconfiguration pathway had been chosen, the niche coalition and the regime coalition will have merged into one, and the niche innovations will have become part of the newly formed regime. In either case, the policy subsystem within the focal socio-technical system will have evolved again into a unitary subsystem.

6 Conclusions and future research on advocacy coalitions in sustainability transitions research

Socio-technical transitions are inherently political. Therefore, scholars in the field of innovation and transition studies have repeatedly called for more attention to be paid to the underlying political processes. By presenting a comprehensive review of the ACF literature on factors influencing coordination, and using this knowledge to make suggestions for the dynamics around advocacy coalition in transition processes, this paper responds to the calls for a better understanding of policy and politics in transition studies (Meadowcroft, 2011). It also delves more specifically into how insights from the ACF (Kern and Rogge, 2018) can inform transition studies.

The literature review identified four categories of factors that influence intra-coalition coordination in advocacy coalitions: (1) prerequisites for coordination; (2) reasons to coordinate; (3) instrumental factors that influence coordination; and (4) the composition of coalitions and their internal organization.

Beyond these four categories, the literature review also highlighted that policy systems in which actors operate can evolve, thereby affecting inter-coalition interactions and coordination. This review shows that inter-coalition coordination can vary, based on the nature of the policy subsystem of which they are part.

Utilizing the findings from the literature review, we developed a typology of two coordination patterns across four transition phases that include intra-coalition and inter-coalition coordination and followed two transitions pathways.

The typology developed in this paper offers a framework that contributes to the sustainability transitions literature by outlining two distinct coordination patterns across four transition phases, providing a nuanced understanding of how advocacy coalitions evolve over time and influence policy subsystems. By framing this typology as conceptual theorizing, we aim to bridge the gap between abstract, high-level theories of socio-technical transitions and empirical observations of coalition dynamics. Specifically, the typology can be used to generate propositions about coalition behaviors and dynamics in different phases, for instance, how contestation levels influence coordination patterns in the disruption phase. Future research could empirically test these propositions across different sectors, such as renewable energy, urban mobility, or biodiversity conservation, to validate the applicability of the typology.

The insights from the typology provide a systematic framework for examining intra-coalition and inter-coalition coordination across different sectors. Researchers can utilize this typology to design case studies that compare sector-specific coalitions—such as those in energy, water management, or transport systems—by analyzing coordination mechanisms, contestation levels, and coalition dynamics across different phases. This approach could help identify generalizable patterns and factors that influence the success or failure of coalition building in sustainability transitions.

Based on these findings and this theorizing, we see two avenues of valuable research to better understand intra-coalition and inter-coalition coordination.

First, there is a substantial need for research on what leads to coordination at the level of individuals and other intra-coalition dynamics. For example, although belief homophily has been the subject of extensive research, it is still not entirely clear under which external circumstances it functions as the glue for coalitions. Furthermore, the influence of diversity on the coalition-building process is not yet well understood. Although there are some suggestions that actor diversity can help to activate different political resources, a more diverse actor set can also inhibit coordination efficiency. Other suggestions have been made for how to manage coalitions, but they lack an empirical foundation. In sum, we found that the ACF literature that deals specifically with coordination is quite broad, but it lacks theoretical and empirical depth with regard to what specifically influences how coalitions grow, remain stable and decline. Although Schlager (1995) conceptually dealt with coalition stability, and Schmid et al. (2020) started looking into the processes that influence advocacy coalition change (growth and decline), these processes have not been well understood, and there is still substantial room for exploration. Exploring these research avenues will be helpful in order to develop the understanding of advocacy coalitions, and could also be helpful in order to understand other fields in which collective agency is relevant, such as the sustainability transitions field.

Second, although the advocacy coalition literature includes research on inter-coalition dynamics and different types of policy subsystems (unitary, collaborative, adversarial), which seem to be quite well described, there is a need for research on how policy subsystems evolve from one type to another, and how this process can shape coalition coordination and, conversely, how coalitions can shape the evolution of policy subsystems. In this manuscript, the different types of policy subsystems have been utilized, but more research, for example on the evolution of policy subsystems, could also be informative. Furthermore, empirical evidence that supports, supplements or nuances the suggested typology on coordination over time is needed to gather a better understanding of the inter- and intra-coalition coordination processes in advocacy coalitions and their role in socio-technical transitions, thereby continuing to respond to the calls from Meadowcroft (2011) and Kern and Rogge (2018).

The main limitation of the literature review is that coordination-related literature was only selected based on the mention of the term "advocacy coalition" in the title, abstract or keywords. As became clear during the process of analysis, some peer-reviewed papers that look at coordination in advocacy coalitions and are thus relevant for this review do not use the term "advocacy coalition" in their title, abstract or keywords. A thorough analysis of the initial corpus identified a number of additional relevant documents based on cross-references, which were then included in the final corpus (Ingold and Fischer, 2014; Calanni et al., 2015; Nohrstedt and Olofsson, 2016; Wray et al., 2017; Weible et al., 2018).

"We acknowledge that the final corpus may not include all relevant papers dealing with coordination in advocacy coalitions. Nonetheless, we believe that our research process was comprehensive enough to capture the majority of the most significant contributions in the literature.

The central premise of the paper posits that the coordination and alignment of actors plays a crucial role in facilitating policy change, serving as a vital precondition for the emergence of sustainability transitions. Consequently, the literature analysis focused primarily on understanding the complex dynamics of coordination—how actors align their interests and actions—rather than detailing the

specific policy changes that such coordinated actions might ultimately achieve.

Data availability statement

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

Author contributions

JW: Conceptualization, Investigation, Methodology, Writing – original draft, Writing – review & editing. ED: Supervision, Writing – review & editing. SN: Supervision, Writing – review & editing. MH: Supervision, Writing – review & editing.

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Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

Publisher's note

Supplementary material

The Supplementary material for this article can be found online at: https://www.frontiersin.org/articles/10.3389/fpos.2024.1497731/full#supplementary-material

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