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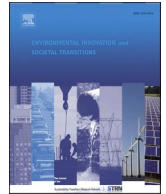
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Research article

Who shapes policy mixes in sustainability transitions? Types of policy entrepreneurship and mechanisms of institutional change

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ABSTRACT

Policy mixes—strategic combinations of policy objectives and instruments—are crucial for addressing complex societal challenges in sustainability transitions. Yet, how their characteristics—such as consistency, coherence, and credibility—emerge, and who shapes them remains unclear. This study poses the question: what role do actors play in shaping the characteristics of policy mixes? By integrating a co-evolutionary framework of policy mixes with a typology of policy entrepreneurship, we trace cycling policies in two Dutch cities using documents, reports, news articles, and interviews. Findings show that political entrepreneurs strengthened political credibility, problem brokers aligned policy objectives with societal needs, and process brokers improved coherence between policymaking and implementation, jointly enhancing policy effectiveness. We formulate propositions that clarify the role of different types of policy entrepreneurship in shaping policy mixes, contributing to research on policy mixes and the role of actors in sustainability transitions.

1. Introduction

The concept of policy mixes—the strategic combination of multiple policy objectives and instruments to address complex societal challenges—has gained increasing recognition in fields such as economics (Claeys, 2006), innovation studies (Flanagan et al., 2011), and policy studies (Howlett and Rayner, 2007). As sustainability transitions, such as decarbonization of the energy system or sustainable urban mobility, inherently involve multi-actor, multi-domain, and multi-level dynamics (Markard et al., 2012), policy mixes are posited to play a critical role in addressing multiple—often conflicting—objectives by facilitating coordination and integration across sectors and scales (Kern et al., 2019). To better capture the complexities of transition processes, the concept of policy mixes has been extended to account for the dynamic interplay between policy designs, processes, and characteristics (Rogge and Reichardt, 2016). These characteristics refer to the alignment of objectives and instruments (consistency), the synergy between policymaking and implementation (coherence), the perceived trustworthiness of the mix (credibility), and the extent to which the mix addresses demand-pull, supply-push, and systemic issues (comprehensiveness) (Rogge and Reichardt, 2016).

Despite this growing focus, there remains a gap in understanding how the characteristics of policy mixes evolve over time. Much of the existing work has analysed or measured policy mix characteristics (Goyal and Howlett, 2021; Rogge and Dutschke, 2018; Schmidt and Sewerin, 2019), while more recent research has examined their impact on outcomes such as energy production (Kanda et al., 2022), innovation (Costantini et al., 2017; Rogge and Schleich, 2018), market creation (Xiong and Qin, 2021), and technology

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adoption (Li et al., 2020). Although some research has begun to explore how institutional settings and policy feedback shape policy mixes' characteristics (Edmondson et al., 2020; Hedeler et al., 2023; Pakizer et al., 2023), the influence of actors remains underexplored (Kern et al., 2019). Understanding the role of actors—especially, individuals or collectives, within or outside the government, actively involved in formulating and implementing policy objectives and instruments—is essential for a more holistic view of how policy mixes evolve and, thereby, influence sustainability transitions.

In this study, we address this gap through the question: what role do actors play in shaping the characteristics of policy mixes? To answer this, we draw on the literature in both innovation studies and policy studies. From innovation studies, we employ the co-evolutionary framework of policy mix feedback (Edmondson et al., 2019), which allows us to explore how policy processes, policy designs, and sociotechnical outcomes evolve over time and shape the characteristics of policy mixes. Simultaneously, we build on Bjerkan and Seter (2021) to employ the notion of policy entrepreneurship—the activities of individuals or collectives who catalyse agenda setting, policy adoption, and implementation (Kingdon, 1984; Roberts and King, 1991)—which can account for diverse actors who have been posited to influence policymaking and implementation, including advocacy coalitions (Gomel and Rogge, 2020; Mukherjee and Howlett, 2015; Sabatier, 1988), government entities (Song et al., 2023), and (non-government or private) intermediaries (Kivimaa et al., 2017). By incorporating these, we illuminate how policy entrepreneurship drives changes in policy mix characteristics, thus contributing to a better understanding of the role of actors in sustainability transitions.

Empirically, we conduct a comparative analysis of cycling policy mixes in two Dutch municipalities: Enschede and Zwolle. While both municipalities have experienced notable successes in cycling policy and infrastructure development, they have followed distinct paths in that process which represent different dynamics in the evolution of policy mixes' characteristics. Cycling is increasingly considered to be an essential component of sustainability transitions, especially in cities, due to its potential to reduce air pollution, improve public health, and enhance land-use efficiency. With its extensive cycling infrastructure and long-standing policy support for cycling, the Netherlands provides an ideal context to study the dynamics of the transition to cycling. Using an inductive approach, we trace the evolution of the cycling policy mixes in these Dutch municipalities during the period 2000–20. These cases provide a rich empirical basis for exploring how entrepreneurship influenced the coherence, consistency, and credibility of cycling policy mixes. Specifically, we examine whether, how, and which type of policy entrepreneurs signal political will, align objectives and instruments, and (re-)enforce policy intentions during implementation—even as institutional, political, and social realities change—to build theory inductively.

The remainder of this paper is structured as follows. In Section 2, we introduce the analytical framework for this study. Then, we specify the research design (Section 3) and present the findings from the (comparative) case analysis (Section 4). Finally, Section 5 discusses the implications of the findings and concludes the study.

2. Analytical framework

2.1. The (co-)evolution of policy mix characteristics

The key characteristics that determine the effectiveness of policy mixes include consistency, coherence, credibility, and comprehensiveness. Rogge and Reichardt (2016) have linked these characteristics to policy processes and policy designs.

- Consistency refers to the alignment of policy objectives and instruments, ensuring they are compatible and mutually supportive. A consistent policy mix avoids contradictions and harnesses synergies.
- Comprehensiveness measures the extent to which the policy mix addresses barriers and failures, for example, through instruments targeting demand-pull, supply-push, and systemic concerns in the sociotechnical system.
- Coherence pertains to the alignment between policymaking and policy implementation, including across levels of government and policy domains. This involves mechanisms such as administrative coordination, integrated decision-making, or strategic planning.
- Credibility refers to the perceived reliability of the policy mix. It is influenced by factors such as political leadership, policy stability, and delegation of responsibilities to independent agencies.

The co-evolutionary framework of policy mixes can help trace the evolution of these characteristics in a sustainability transition. By integrating policy feedback theory (Oberlander and Weaver, 2015; Pierson, 1993; Skocpol, 1992) with the work of Rogge and Reichardt (2016), Edmondson et al. (2019) propose that policy mixes—based on their design and characteristics—shape socio-technical outcomes through three main effects. While resource effects pertain to the impact of (re-)distribution of resources on specific constituencies, interpretive effects influence how actors frame societal issues or assess policy alternatives, and institutional effects reflect the interaction between policy mixes and the broader institutional environment. These effects generate administrative, financial, or sociopolitical feedback in the policy subsystem, either reinforcing support for the policy mix (positive feedback) or undermining it (negative feedback). Thus, co-evolutionary dynamics induce changes in both policy processes and policy designs, affecting policy mix characteristics.

While the co-evolutionary framework has been applied to this end previously, the specific role of actors in shaping these characteristics has not been systematically explored. Edmondson et al. (2020) used the framework to highlight how policy mixes and socio-technical systems co-evolve through feedback, but did not focus on the role of actors. Hedeler et al. (2023) and Pakizer et al. (2023), while leveraging policy feedback theory, similarly explored policy mix evolution without centring on actor roles. Some work has, however, linked actors to specific policy mix characteristics—Gomel and Rogge (2020), for instance, examined how advocacy coalitions perceive and influence policy mix characteristics, while Song et al. (2023) highlighted the role of government entities in

coordination and resource mobilization. In contrast to these, a policy entrepreneurship lens can account for a wider diversity of actors—both private and public—involved in policymaking and policy implementation, and uncover the mechanisms through which changes occur. Yet, the role of policy entrepreneurs in shaping policy mix characteristics remains underexplored.

2.2. Policy entrepreneurship

The concept of policy entrepreneurship was first introduced by Kingdon (1984) in his seminal work on the multiple streams framework. Kingdon described policy entrepreneurs as individuals who invested significant resources and/or time in placing an issue on the policy agenda by aligning (or ‘coupling’) relatively independent policymaking activities (or ‘streams’)—problem framing, alternatives specification, and political decision-making—during windows of opportunity. Subsequent research has highlighted the role of policy entrepreneurs across various jurisdictions and policy domains (Frisch Aviram et al., 2020), including in sustainability transitions (Bjerkan and Seter, 2021; Meijerink and Huitema, 2010). Moreover, the concept has been employed in several policy process theories, including incrementalism, institutionalism, advocacy coalition framework, and punctuated equilibrium (Bakir, 2009; Carter and Jacobs, 2014; Heikkilä et al., 2014; Mintrom and Norman, 2009; Mintrom and Vergari, 1996; Nohrstedt, 2011).

Over time, scholars have moved away from the ‘lone hero’ narrative (Cairney, 2018), recognizing policy entrepreneurship as a collective or institutional act (Bakir and Jarvis, 2017; Capano and Galanti, 2021; Smith and Cumming, 2017). Research has found that a variety of actors engage in policy entrepreneurship, including those within and outside the government (Brouwer and Huitema, 2018), operating at different career stages in the bureaucracy (Arnold, 2015; Paquet, 2015) and/or in diverse positions in policy networks (Kalafatis et al., 2015). These actors may focus on diverse aspects of the system, such as culture, norms, politics, projects, standards, and technologies (Boasson and Huitema, 2017; Maor, 2017; Taylor et al., 2011). Moreover, policy entrepreneurs do not limit their activities to agenda-setting; they play pivotal roles in policy adoption and implementation (Aberbach and Christensen, 2014; Arnold, 2015; Herweg et al., 2015; Knaggård, 2015).

Building on this more comprehensive understanding, Goyal et al. (2020) have proposed a typology that identifies five distinct roles that entrepreneurs can play throughout the policy cycle:

- Problem brokers focus on framing policy issues, for example, by creating awareness, capitalizing on ‘focusing’ events, altering perceptions using benchmarks and indicators, and brokering knowledge (Knaggård, 2015, 2016; Roberts and King, 1991).
- Policy entrepreneurs develop and promote specific policy alternatives, for example, by sharing knowledge, constructing models of best practice, ‘shopping’ for appropriate policy venues, and initiating pilot projects (Kingdon, 1984).
- Political entrepreneurs build or lend political support for policy proposals, for example, by negotiating with influential stakeholders, navigating partisan dynamics, and mobilizing public opinion (Roberts and King, 1991; Zohlnhöfer et al., 2016).
- Process brokers steer the formulation and implementation phase of a policy, for example, by networking, building trust, navigating conflict and preventing deadlock, creating implementation strategies, and institutionalizing policy (Christopoulos and Ingold, 2015; Giest, 2018; He, 2018).
- Program champions support the implementation of a policy, for example, by operationalizing a ‘fuzzy’ design, coordinating in a multilevel environment, navigating uncertainty in an adaptive manner, and preventing ‘street-level divergence’ (Daley et al., 2013; Gofen, 2013; Petchey et al., 2008; Richard-Ferrouddji, 2014).

This typology offers a comprehensive framework for understanding how policy entrepreneurship shapes processes across the policy cycle. In the next section, we begin to integrate this concept with the co-evolutionary framework.

2.3. Bridging co-evolutionary dynamics and policy entrepreneurship

By integrating the concept of policy entrepreneurship into the co-evolutionary framework on policy mixes, we can explore how the activities of diverse actors shape these policy mixes and their characteristics over time.

Policy entrepreneurship engages in various activities throughout the policy process, influencing key characteristics of the policy mix. A political entrepreneur may, for example, influence the credibility of the policy mix by signalling political commitment or securing the necessary political support for long-term policy stability. A problem broker may influence how sociotechnical problems are framed, altering the alignment between policy objectives and instruments and thereby affecting the perceived comprehensiveness or consistency of the policy mix. Policy entrepreneurs may also influence both comprehensiveness and consistency depending on how their proposed policy alternatives align with various policy objectives. Further, a process broker and program champion may influence coherence by affecting the pace of the process and operationalization of the policy design. Thus, through these various activities, policy entrepreneurship influences the characteristics of policy mixes, ultimately influencing how these mixes evolve.

The ability of policy entrepreneurship to influence the policy mix is tied to its responsiveness to feedback from the socio-technical system. Problem brokers may monitor public perception or track relevant indicators to assess whether the policy mix is seen to address the problem at hand. Policy entrepreneurs, on the other hand, may focus on cues regarding the financial viability and normative acceptability of policy instruments, revisiting their strategies if resource constraints or normative changes threaten the sustainability of their ideas. Political entrepreneurs are likely to closely look out for political feedback, such as shifts in public opinion, partisan dynamics, and interest group mobilization. Meanwhile, process brokers and program champions may pay more attention to administrative feedback, such as changes in resource availability or regulatory bottlenecks, and adapt their implementation strategies accordingly. In response to feedback, policy entrepreneurs adjust their strategies and activities, influencing policy processes

continuously.

Over time, the presence and interaction of different types of policy entrepreneurs drive changes in policy mixes through processes such as replacement, layering, drift, and conversion (Thelen, 2009). For example, replacement—intentional redesign of the policy mix (Kern and Howlett, 2009)—might require synergy and coordination among the different types of policy entrepreneurs. On the other hand, layering—the addition of new policy objectives and instruments that are inconsistent with existing ones (Kern and Howlett, 2009)—might occur when a problem broker or a policy entrepreneur push for the adoption of their issue framing or policy alternative—respectively—with little support for redesign, affecting the credibility and consistency of the policy mix. Drift—the inclusion of new policy objectives without a change in the instrument mix (Kern and Howlett, 2009)—meanwhile, could result from the active involvement of a problem broker without a presence of a policy entrepreneur, undermining consistency. Finally, conversion—the modification of the instrument mix without a change in the policy objectives (Kern and Howlett, 2009)—could result from the absence of an active problem broker or discretionary implementation by a program champion, adversely affecting coherence of the policy mix. Through such processes, policy entrepreneurship influences not only the immediate characteristics of a policy mix but also its long-term evolution (Fig. 1).

3. Research design

We explore the relationship between policy entrepreneurship and policy mix characteristics using an inductive, comparative case study design. Our initial aim was to explore the relationship between policy mix characteristics and ‘policy success’ using the co-evolutionary framework. However, as the data analysis progressed, it became evident that actors played a key role in shaping the evolution of these characteristics and, thereby, policy effectiveness. This emergent focus shed light on how policy entrepreneurship can influence the characteristics of policy mixes, contributing to their success.

3.1. Case selection

Our empirical analysis is based on an analysis of cycling policy mixes in two Dutch municipalities—Enschede and Zwolle—from 2000 to 2020, during which both municipalities experienced significant policy development.

This case selection was based on three criteria. First, despite the overall success of the Netherlands in cycling as a mode of transport, the variation in cycling between Dutch municipalities is nontrivial. This variation enables us to zoom in on the drivers and effects of local policy mixes while keeping external conditions such as geography and the wider institutional environment as relatively constant. Second, Enschede and Zwolle are reasonably comparable in terms of their size, demographics, socio-economic characteristics—external factors that influence bikeability—thus enabling a more controlled analysis of how local governance and policy entrepreneurship influence the characteristics of policy mixes. Third, most importantly, despite these similarities, the two municipalities have followed different paths in the development of cycling policy, representing varied dynamics in the evolution of policy mix characteristics. While Enschede experienced a decline in cycling policy ambition and activities in the early 2000s followed by a substantial recovery after 2010, Zwolle has exhibited consistent growth in cycling policy ambition and activities over the same period. These contrasting trajectories provide an opportunity to investigate how different types of policy entrepreneurship have shaped the evolution of policy mix characteristics.

3.2. Data collection

The data for the study were collected from a range of primary and secondary sources. First, we collected national and municipal policy documents related to cycling and mobility during 2000–2021 in order to identify the policy objectives and instruments in each municipality (Table 1).

Second, we drew on three complementary data sources to assess the key sociotechnical outcome of interest, bikeability: CBS Netherlands (2020) provided official statistics on modal shares over time; the Fietsbalans 1 (2000) and Fietsbalans 2 (2009) provided an assessment of the cycling climate based on indicators of comfort, infrastructure, safety, and usage across Dutch municipalities; and the Fietsstad 2020 survey shed light on city-level bicycling satisfaction based on cycling experience (especially for the vulnerable cyclist), infrastructure, maintenance, and network. Together, these sources allowed us to triangulate the trend in bikeability in each municipality during 2000–20.

Third, we conducted six semi-structured interviews to explore the dynamics of policymaking and implementation, particularly the role of policy entrepreneurship in moving the policy process and shaping policy design. The interviewees included local government employees, municipal bureaucrats, representatives of the Dutch Cyclists’ Union (Fietzersbond)—a civil society organization—and researchers who had observed or influenced the policy process in the two municipalities during 2000–20.

Fourth, we examined relevant news to track key debates, events, political discourse, and public opinion during our study period. Specifically, we searched the CROW-Fietsberaad online archive—which catalogues cycling-related news from various publications—the Fietzersbond website—for press releases, reports, and surveys—and the Bicycle Dutch weblog, for a narrative account of cycling infrastructure development in the Netherlands more broadly. While not exhaustive, these provided relevant information for assessing process dynamics and triangulating information from other sources.

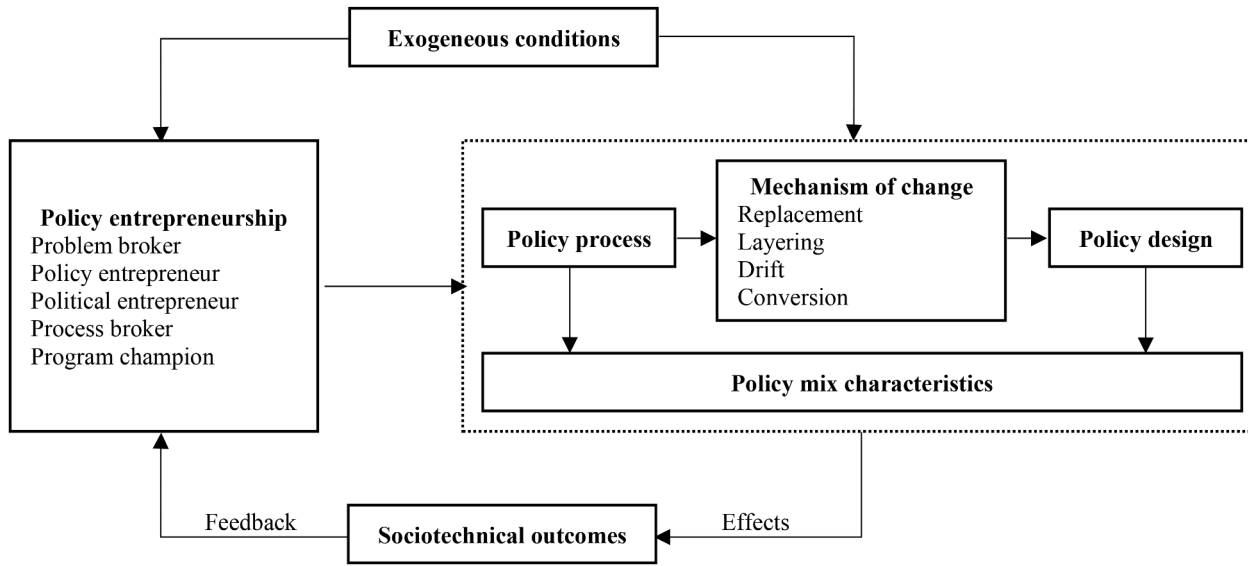


Fig. 1. The role of policy entrepreneurship in the evolution of policy mixes.

Table 1

List of policy documents collected for the study.

Jurisdiction	Year	Document	Source
National	2013	Actieprogramma mobiliteit 2014–2017	CROW-Fietsberaad
National	2016	Green deal on zero emission city logistics	Ministerie voor Infrastructuur en Water
National	2017	Tour de Force	Tour de Force
Enschede	2005	Mobiliteitsplan 2005–2015	Gemeente Enschede
Enschede	2012	Fietsvisie 2012–2020	Gemeente Enschede
Enschede	2015	Factsheet – Fietsvisie 2015	Gemeente Enschede
Enschede	2018	Retailvisie	Gemeente Enschede
Enschede	2021	Fietsvisie 2030	Gemeente Enschede
Zwolle	2000	Kwaliteit binnen bereik	Gemeente Zwolle
Zwolle	2001	Audit of the Cycling Policy of Zwolle	Bicycle Policy Audit
Zwolle	2005	Bereikbaarheidsplan Binnenstad	Gemeente Zwolle
Zwolle	2005	Fietsstratenplan	Gemeente Zwolle
Zwolle	2014	Nota uitwerkingsplan fietsparkeren fase III	Gemeente Zwolle
Zwolle	2019	Mobiliteitsvisie 2020–2030	Gemeente Zwolle

3.3. Data analysis

The data were analysed using a combination of qualitative coding and process tracing. An initial coding scheme was developed from the co-evolutionary framework of policy mixes, focusing on policy design (objectives and instruments), policy mix characteristics, sociotechnical outcome, and feedback. Following the distinction between top-down and bottom-up approaches, our analysis was primarily top-down for policy design (coding official documents for objectives and instruments and tracking their evolution), complemented by a bottom-up perspective when assessing coherence, where we compared design ‘on paper’ with implementation using interviews and archival/web sources.

We first identified the range of policy instruments used by Dutch municipalities from the literature (used as a reference list for coding). All policy documents were translated into English and systematically reviewed to identify policy objectives (e.g., accessibility, modal share, network length) and policy instruments (e.g., bicycle streets, parking regulation, infrastructural investments). This allowed us to track key changes in objectives and instruments in Enschede and Zwolle between 2000 and 2020. We also assessed bikeability as the main sociotechnical outcome. Using CBS modal share statistics, Fietsbalans 1 and 2, and the Fietsstad 2020 benchmarking survey, we traced changes in cycling conditions, experience, and reputational standing over time and treated these as feedback into the policy process.

Second, to assess policy mix characteristics, we developed an operational framework linking their conceptual definitions to available evidence. Consistency was examined by comparing whether policy objectives and instruments stated in policy documents supported or contradicted one another. Coherence was analysed as the alignment between policy design “on paper” and its implementation in practice, drawing on interviews, policy documents, and news reports. Credibility was assessed as the perceived trustworthiness of the policy mix. We traced through shifts in policy ambition as expressed in policy documents and public perception reported in interviews, news, and surveys (considered as high when ambitious objectives were accompanied by evidence of delivery and positive societal reception, and lower when ambition was downgraded or not matched by action). Comprehensiveness was assessed by mapping the breadth of objectives and instruments against demand-pull, supply-push, and systemic concerns in the cycling system, though in practice such coverage was limited in both cases.

Third, we traced the dynamics between policy design, sociotechnical outcomes, and feedback. We examined whether and how policies had resource, interpretive, and institutional effects (e.g., investment in infrastructure; reframing cycling within mobility strategies) that influenced bikeability. Then, we examined whether and how changes in bikeability generated socio-political, administrative, or fiscal feedback (e.g., satisfaction, criticism, benchmarking). Whether and how policy feedback affected the policy process and policy design was investigated thereafter. Exogenous developments (e.g., the rise of the e-bike) were coded separately, based on both the literature and case evidence, to distinguish them from policy-induced dynamics.

Finally, while our initial analytical framework did not explicitly foreground the role of actors, the data analysis revealed that they were central to the dynamics we observed. To address this, we drew on the typology of policy entrepreneurship introduced in [Section 2.2](#). Specifically, we examined whether entrepreneurial activities influenced policy ambition and stability (thereby credibility), the choice of policy objectives and instruments (thereby consistency), and policymaking and implementation practices (thereby coherence). We then considered whether these activities were associated with mechanisms of institutional change—replacement, layering, drift, or conversion—observable in the evolution of municipal policy designs.

Process tracing is a qualitative method that involves systematically investigating the relationship among contexts, events, and activities to map out how specific outcomes are produced ([Morgan, 2016](#)). We applied process tracing by reconstructing event sequences around critical junctures where objectives, instruments, or implementation visibly shifted (e.g., formulation of cycling vision, adoption of bicycle roundabout, construction of bicycle highway). For each sequence, we traced evidence from available sources—linking policy documents with interviews, news, and surveys—to contextualize process dynamics. A link between policy feedback, entrepreneurial action, and subsequent design change was judged plausible when sources converged to suggest temporal ordering and influence.

4. Findings

In this section, we trace the cycling policy mixes in Enschede and Zwolle during 2000–20. The findings are structured around two main themes: (i) the evolution of the characteristics of policy mixes in each city; and (ii) the role of policy entrepreneurship in shaping these characteristics in each city.

4.1. The evolution of the characteristics of the policy mix

The two cases illustrate distinct trajectories in the evolution of cycling policy mixes within broadly similar cultural and institutional context (Table 2). Enschede entered the 2000s with a credible and consistent mix but experienced a decline during that decade, as political ambition waned and instruments failed to address critical weaknesses in safety and comfort. It recovered in the 2010s through renewed objectives, targeted investments, and external validation, resulting in a more credible and coherent mix by 2020. Zwolle, by contrast, maintained a consistently credible policy mix throughout the period, steadily expanding its instruments and integrating cycling into broader mobility strategies. Although tensions with car-oriented objectives occasionally weakened consistency, coherence and credibility remained strong, and the city reinforced its position as a leading cycling municipality.

We describe these dynamics in further detail below.

4.1.1. The case of Enschede

By 2000, Enschede's cycling policy mix exhibited relatively high credibility and consistency. Cycling accounted for nearly 40 percent of short-distance trips (CBS Netherlands, 2020), reflecting both a supportive cultural environment and sustained political attention. Municipal objectives at the time emphasized accessibility and the expansion of the cycling network, and these were largely matched by a set of instruments that included bicycle-friendly intersections, car-free streets, and parking regulation (Ligtermoet, 2006; Bicycle Dutch, 2014). The alignment between objectives and instruments indicated a consistent mix, with limited internal contradictions. Coherence was evident, as many of the planned measures were implemented and visible in the city's infrastructure. However, comprehensiveness was consistently narrow, as policy remained focused primarily on supply-push instruments with little attention to broader systemic or demand-side measures, a pattern common across Dutch municipalities during this period (Veeneman, 2012).

During the 2000s, Enschede's cycling policy mix lost much of its earlier credibility and consistency. The Enschede Municipality Plan 2004–15 gave limited attention to cycling, while maintaining support for car infrastructure and shifting resources toward bus services to promote economic growth (Gemeente Enschede, 2005). This reduced the level of ambition for cycling, undermining the credibility of the cycling policy mix. Consistency weakened as policy documents continued to mention objectives such as accessibility, yet instruments concentrated largely on parking provision (Gemeente Enschede, 2005), leaving critical issues of comfort and road safety unaddressed (Fietzersbond, 2009). Coherence was also low, as the mismatch between design and implementation became apparent: while plans promised a balanced approach, in practice investments in car parking outpaced improvements in cycling infrastructure, and initiatives such as regional cycling highways remained underdeveloped (B. Groenewolt, personal communication, June 13, 2021). Comprehensiveness remained narrow, with little effort to expand beyond infrastructure to systemic or demand-pull measures.

From 2010 onwards, Enschede's cycling policy mix regained credibility and strengthened in both consistency and coherence. The Cycling Vision 2012–2020 set ambitious objectives: raising cycling's modal share for short trips to 40 percent, reducing serious casualties by 30 percent, and unbundling one-fourth of the network from motorized traffic (Gemeente Enschede, 2012). These objectives were accompanied by targeted instruments, including investments in high-capacity cycling highways, expanded bicycle parking, and safety campaigns (Gemeente Enschede, 2012). This alignment of objectives and instruments restored consistency, while the visible implementation of initiatives to promote cycling, reduce theft, and upgrade the infrastructure strengthened coherence (Gemeente Enschede, 2015). Credibility was reinforced by ambitious objectives, resource commitments, and external validation: by 2019, cycling accounted for 43 percent of short trips, surpassing the city's target, and Enschede was awarded Best Large Municipality in the Fietstad

Table 2

Comparison of policy mix characteristics in Enschede and Zwolle.

Characteristic	Enschede	Zwolle
Credibility	High in 2000 with political support and cultural backing; declined in the 2000s as attention and resources shifted to cars and public transport; restored in the 2010s with ambitious objectives, investments, and external recognition.	High and stable throughout; supported by long-standing investments and political backing; reinforced in the 2010s through an ambitious vision and sustained implementation.
Consistency	Strong in 2000 as objectives and instruments were aligned; weakened in the 2000s as objectives (e.g., safety, accessibility) diverged from instruments (mainly parking provision); restored in the 2010s as renewed objectives were matched with targeted investments.	Generally strong from 2000 onwards; improved in the 2000s as cycling was more firmly embedded in mobility strategies; occasional tensions with car-oriented objectives, but overall consistent.
Coherence	Evident in 2000 as planned measures were implemented; weakened in the 2000s due to a gap between policy design and delivery; strengthened in the 2010s through visible implementation of new cycling projects.	High across the period; earlier commitments translated into steady infrastructure delivery; coherence reinforced in the 2000s and 2010s through implementation of bicycle parking, roundabouts, streets, and tunnels.
Comprehensiveness	Narrow across the period; focused mainly on infrastructure, with limited systemic or demand-side measures.	Similar to Enschede; focused mainly on supply-push due to simultaneous car orientation.

2020 competition (CBS Netherlands, 2020; Gemeente Enschede, 2021). Yet, comprehensiveness remained relatively limited, as policy still focused heavily on the supply side.

Taken together, Enschede's cycling policy mix was credible and consistent in 2000, weakened during the 2000s as ambition declined and instruments became misaligned, and strengthened again after 2010 with renewed objectives, improved implementation, and external validation.

4.1.2. The case of Zwolle

By the turn of the century, Zwolle's cycling policy mix displayed high credibility, built on decades of investment in a separated cycling network and bicycle-friendly crossings (Gemeente Zwolle, 1978). The Faster by Bike programme of 1994 aimed to complete a high-quality network and increase bicycle use by 10 percent (BYPAD, 2001). Cycling accounted for around 43 percent of trips within the city (CBS Netherlands, 2020), making Zwolle one of the strongest performers nationally. Consistency was generally strong, as objectives to improve cycling conditions were supported by dedicated instruments, though some tensions remained due to the parallel emphasis on car accessibility in municipal strategies here as well (Veeneman, 2012). Coherence was visible in translation of earlier policy commitments into tangible infrastructure. Yet, comprehensiveness was limited, since the focus remained mainly on infrastructure rather than on broader systemic or demand-side measures.

During the 2000s, Zwolle sustained high credibility, with continued political and financial support for cycling (A. Kamermans, personal communication, June 16, 2021; E. Koster, personal communication, June 9, 2021; S. Tjepkema, personal communication, June 23, 2021). Municipal policies such as the Bicycle Street Plan (2005) and the City Centre Accessibility Plan (2005) expanded the city's cycling infrastructure and integrated it into broader mobility planning (CROW-Fietsberaad, 2005; Gemeente Zwolle, 2005). Consistency improved as objectives for cycling were more firmly institutionalized in mobility strategies, though the dual orientation toward car accessibility persisted. Coherence was strong, with steady implementation of bicycle streets, parking facilities, and traffic calming in line with policy commitments. Comprehensiveness remained modest as most attention was still directed at infrastructure provision (supply-push), although safety and accessibility concerns received growing recognition.

In the 2010s, Zwolle's cycling policy mix retained high credibility and increased in ambition. The Mobility Vision 2020–2030 (2019) explicitly adopted the STOP principle, prioritizing walking and cycling over cars in urban planning (Gemeente Zwolle, 2019). Consistency was reinforced by new policy instruments, such as bicycle roundabouts, tunnels, and the Hattem–Zwolle fast cycle route, which improved safety and regional connectivity (De Stentor, 2011; Bicycle Dutch, 2013). Coherence remained high as these projects were implemented successfully (S. Tjepkema, personal communication, June 23, 2021). Comprehensiveness broadened slightly, with greater emphasis on safety and connectivity, though policy remained primarily infrastructure-focused. Administrative recognition through benchmarking, positive public reception, and a stable modal share of nearly 50 % confirmed the credibility and effectiveness of Zwolle's policy mix (CBS Netherlands, 2020).

Overall, Zwolle's cycling policy mix was credible and consistent in 2000, strengthened further in the 2000s with ambitious planning and steady implementation, and remained credible, consistent, and coherent through the 2010s, despite limited attention to systemic comprehensiveness.

4.2. The role of policy entrepreneurship

4.2.1. The case of Enschede

The evolution of Enschede's cycling policy mix was driven by two key types of policy entrepreneurs: a newly elected alderman in 2010, who acted as a political entrepreneur, and Fietsersbond, which played the role of a problem broker.

The fireworks disaster of 2000 was an exogenous shock that reshaped politics in the city. The ensuing public discontent over perceived government apathy, led to the resignation of the alderman and a shift in municipal direction under new leadership (Gemeente Enschede, n.d.; Van Dinther, 2001). The resignation of the pro-cycling alderman marked the end of a period in which cycling had enjoyed sustained political support. The subsequent alderman prioritized public transport to enhance connectivity between the two economic centres of the city, as reflected in the Enschede Municipality Plan 2004–15, and allocated significant resources for bus services (Gemeente Enschede, 2005). This re-orientation represented a case of replacement, but in an unfavourable direction: the mix lost credibility as policy ambition was downgraded, and consistency weakened as policy instruments focused narrowly on bicycle parking (Fietsberaad, 2007; W. Koolhoven, personal communication, June 10, 2021).

By the late 2000s, Fietsersbond emerged as a problem broker, amplifying negative socio-political feedback. This national organization played a key role in creating awareness about the cycling climate in the Netherlands, more generally, and the poor performance of the municipality, specifically, on comfort and safety (Fietsersbond, 2009). Further, its semi-autonomous Enschede branch also actively contributed to delegitimizing the status quo by reinforcing the issue of poor safety and revealing public support for investment in cycling infrastructure (Fietsberaad, 2012). In doing so, Fietsersbond helped translate user dissatisfaction into political pressure.

The 2010 municipal election provided a window of opportunity for a candidate for the post of the alderman to act as a political entrepreneur. By politicizing the findings of the survey and positioning cycling as a neglected policy area, the political entrepreneur mobilized dissatisfaction into electoral support (Enschede-Stad.nl, 2012; W. Koolhoven, personal communication, June 10, 2021). Once elected, the new alderman initiated a second episode of replacement, this time favourable to cycling. Under his leadership, the city council assigned four policy executives to work on a new cycling plan with input on intersection design and traffic flow from mobility designers (W. Koolhoven, personal communication, June 10, 2021). The Cycling Vision 2012–2020 set ambitious objectives, directly addressing the deficiencies identified by Fietsersbond (Gemeente Enschede, 2012). Importantly, these were backed by

appropriate policy instruments that generated interpretive and resource effects: cycling was actively promoted among city residents and funds were allocated to expand the cycling network, install additional traffic signals, and undertake maintenance of cycling paths (Gemeente Enschede, 2012). Such commitments reinforced the credibility of the policy mix.

Fietzersbond Enschede continued to play a role in ensuring that the policy design addressed user requirements. For example, a study in 2016 found that Enschede performed the worst in the Netherlands on the metric of bicycle theft (Oost, 2016). This created negative socio-political feedback and prompted the municipality to act. Fietzersbond, along with the police department, was consulted by the municipality for developing an effective intervention to address the issue (W. Koolhoven, personal communication, June 10, 2021). Subsequently, the number of reports of bicycle theft around the train station declined substantially (Keypoint Consultancy, 2018). By advocating for and enabling alignment between policy objectives and instruments, Fietzersbond reinforced the consistency of the policy mix.

Thus, the activities of the alderman and Fietzersbond were mutually reinforcing. Fietzersbond's problem framing provided an evidence base for the alderman's political agenda—enabling the effective politicization of cycling during the 2010 election—and subsequent implementation of the cycling vision. In turn, the alderman's leadership ensured that Fietzersbond's recommendations were translated into policy instruments, supported by financial and institutional commitment. This interplay between the political entrepreneur and problem broker not only strengthened the credibility and consistency of the policy mix, but also enhanced its overall effectiveness.

4.2.2. The case of Zwolle

The evolution of Zwolle's cycling policy mix was shaped primarily by two types of policy entrepreneurs: municipal bureaucrats—who acted as process brokers and, to some extent, program champions—and Fietzersbond Zwolle, which served as a problem broker.

Municipal bureaucrats played a central role in ensuring that cycling policy remained on the executive agenda. A key strategy was to adapt the framing of cycling projects to the priorities of successive aldermen, thereby ensuring political acceptability even when cycling was not a core concern (E. Koster, personal communication, June 9, 2021). S. Tjepkema recalled: “sometimes you have to change your reasons... according to the political wind which is blowing” (personal communication, June 23, 2021). Under aldermen from the Liberal Party, for example, cycling was justified as a way to reduce congestion and ‘make space for the necessary car traffic,’ with bicycle tunnels incorporated into road-widening projects to secure national co-financing. In this way, process brokers aligned cycling with shifting political agendas, institutionalizing it within municipal strategies despite variation in elected leadership.

Their role was especially visible in the creation of the Hattem–Zwolle fast cycling route. Initially unfunded, this project risked being sidelined after the national government declined to contribute to the construction of a planned cycle bridge alongside a new train route. Municipal bureaucrats had, nevertheless, commissioned studies demonstrating the benefits of such a connection, and kept them ‘in the drawer’ (S. Tjepkema, personal communication, June 23, 2021). When a fire on a train exposed the lack of emergency access to the railway track, bureaucrats seized the moment. They reframed the cycle bridge as an emergency corridor for fire and ambulance services, using the earlier study to justify investment (S. Tjepkema, personal communication, June 23, 2021). This framing unlocked provincial and municipal funding, enabling the bridge's construction as part of the cycle route (De Stentor, 2011). Thus, process brokers prevented drift and instead facilitated conversion, as emergency planning agendas were repurposed to advance cycling policy objectives.

Bureaucrats also mobilized resources by linking cycling to other policy domains, reflecting their role as process brokers. In earlier years, bicycle bridges and tunnels were incorporated into national road projects, ensuring that cycling benefitted from external investments. More recently, housing development provided a new trigger. As Zwolle sought to accommodate population growth, bureaucrats tied proposals for bicycle tunnels to residential expansion, financing construction through land revenues from sold parcels (S. Tjepkema, personal communication, June 23, 2021). Such cross-domain manoeuvring illustrates the capacity of senior bureaucrats to manipulate institutional rules and opportunities, ensuring that cycling remained embedded in shifting municipal priorities and that projects moved from intent to implementation.

Process brokering was also evident in the way municipal bureaucrats connected stakeholders to address safety. To reduce accidents in high-traffic areas, the municipality collaborated with Fietzersbond, the police, and residents to design and implement bicycle roundabouts (Bicycle Dutch, 2013; S. Tjepkema, personal communication, June 23, 2021). Here, bureaucrats went beyond process brokering. By developing specifications, overseeing delivery, and promoting adoption, they undertook the role of program champions, ensuring that interventions were embedded in practice. These roundabouts not only received positive feedback from the public (E. Koster, personal communication, June 9, 2021) but also earned the city administration national recognition for promoting “Cycling without obstacles” (Fietseraad, 2014), further reinforcing the credibility of the policy mix.

Once again, Fietzersbond complemented bureaucratic entrepreneurship by consistently acting as a problem broker. It published reports that drew attention to persistent gaps in safety (Fietzersbond Zwolle, 2004) and recurring shortages in bicycle parking (Fietzersbond Zwolle, 2014). By framing these as pressing user concerns rather than technical shortcomings, Fietzersbond Zwolle highlighted misalignment between policy objectives and the cycling climate, creating socio-political pressure for municipal action. In this way, it reinforced the consistency of the mix by ensuring that new objectives and instruments were responsive to citizen priorities.

The organization also contributed to the design and validation of solutions. Its evaluation of a bicycle street pilot confirmed strong public support, legitimizing the expansion of the program across the city (Candelari, 2020; E. Koster, personal communication, June 9, 2021). In co-design processes such as the development of bicycle roundabouts, Fietzersbond represented user perspectives and helped embed everyday experience into technical design (Bicycle Dutch, 2013). These activities further strengthened consistency by aligning policy instruments with sociotechnical requirements.

The activities of municipal bureaucrats and Fietzersbond were mutually reinforcing. Fietzersbond's problem framing based on socio-political feedback identified deficiencies, while bureaucrats converted these concerns into viable, resourced, and delivered projects. This interplay prevented drift, enabled conversion by linking cycling projects to other domains such as emergency planning and housing development, and sustained credibility through ongoing implementation. Together, these activities illustrate how the collaboration between problem brokers and process brokers allowed Zwolle's cycling policy mix to remain consistent and coherent, despite competing pressures from other policy priorities.

Thus, the two cases reveal contrasting entrepreneurial dynamics: in Enschede, political entrepreneurship and problem brokering produced episodic replacement, while in Zwolle, bureaucratic process- and problem-brokering sustained continuity and prevented drift (Table 3).

5. Discussion

5.1. Case comparison and synthesis

Both municipalities demonstrated success in advancing cycling policies, yet their trajectories reveal how exogenous events, policy feedback, entrepreneurial strategies, and mechanisms of institutional change shaped policy mix characteristics in distinct yet interconnected ways.

Credibility in both Enschede and Zwolle was influenced by the alignment of political commitment with cycling policy objectives, though the mechanisms differed significantly. In Enschede, credibility was restored after a period of unfavourable replacement, largely through the actions of a political entrepreneur who leveraged negative public feedback to prioritize cycling. By establishing the Enschede Cycling Vision and securing funding for high-profile projects such as the F35 cycling highway, this actor signalled long-term commitment and re-established trust in the cycling policy mix. In contrast, Zwolle maintained steady credibility over time without reliance on a single political figure or party. Process brokers within the municipal administration ensured that cycling initiatives consistently aligned with broader agendas, such as congestion mitigation, emergency infrastructure, and housing expansion. By framing cycling as a solution to pressing issues, they garnered cross-party political support and institutional resources. These contrasting approaches suggest that while political entrepreneurship is critical for restoring credibility after disruptions, process brokers can sustain incremental improvements over time.

Consistency, defined as the alignment among policy objectives and instruments, was achieved in different ways across the two municipalities but faced common challenges. Both Enschede and Zwolle relied on a problem broker (Fietzersbond) to identify societal issues and advocate for solutions aligned with cycling objectives, such as a high-quality network and rider safety. Enschede initially struggled with consistency, as political neglect during the 2000s led to fragmented efforts and limited alignment between objectives and instruments. However, post-2010, ambitious objectives set by the political entrepreneur provided a clearer framework for the problem broker to influence policy and facilitate consistency in design. Zwolle, on the other hand, maintained a relatively high degree of consistency in policies through proactive planning and strong engagement with the problem broker. Nevertheless, both municipalities encountered tensions between competing priorities; for example, Zwolle's emphasis on maintaining car-oriented policies occasionally undermined the cycling policy mix. These findings highlight that problem brokers can play a key role in enhancing consistency, but their success may depend on complementary support from a political entrepreneur or process broker.

Coherence, or the alignment between policymaking and implementation, revealed important contrasts between the two municipalities but also underscored common enabling factors. In Zwolle, coherence was sustained by process brokers who integrated cycling policies into broader institutional agendas, such as economic competitiveness, housing development, and regional mobility strategies. For instance, the Hattem-Zwolle Fast Cycle Route was reframed as a safety-critical infrastructure project, securing the necessary institutional support and resources for its implementation. Enschede, by contrast, struggled with coherence during the 2000s, as weak political commitment led to a disconnect between policy objectives and implementation. However, post-2010, collaboration between the municipal administration and problem brokers translated the renewed cycling vision into targeted interventions, such as the bicycle theft reduction campaign and the unbundling of cycling networks. These findings suggest that process brokers can be vital for bridging policymaking and implementation, particularly in contexts where political entrepreneurship is lacking. However, when political entrepreneurs play a prominent role, as in Enschede, top-down initiatives can drive coherence more directly, complementing the bottom-up efforts of process brokers.

Comprehensiveness, or the extent to which a policy mix addresses demand-pull, supply-push, and systemic barriers, was limited in both municipalities. Both Enschede and Zwolle focused primarily on infrastructure improvements and road safety, often neglecting broader systemic challenges. For example, while investments were made in cycling networks and parking facilities, there was little effort to actively shift travel behaviour from cars to bicycles. This neglect was partly driven by a perceived reliance on inter-city commuters for economic activities, which discouraged more aggressive supply-push measures. Without integrated approaches that address systemic challenges, the policy mix may struggle to drive substantial modal shifts over time.

Further, both cases illustrate that policy entrepreneurship can originate inside or outside the government. In Enschede, for example, the alderman and Fietzersbond—a civil society organization—each played distinctive yet complementary roles in shaping the cycling policy mix. Similarly, in Zwolle, entrepreneurial activity was driven primarily by municipal bureaucrats and Fietzersbond. While businesses may also exercise policy entrepreneurship, in our study they were not prominent. This might have been the case due to our focus on the local level along with the embedded nature of the cycling in the Netherlands, which meant that public policy objectives are already largely aligned with the interests of the cycling industry.

Although this study focused on the characteristics of local policy mixes, we nonetheless observed that Fietzersbond—a national

Table 3

Summary of policy entrepreneurship, mechanisms of change, and influence on policy mix observed empirically.

Role	Actor	Strategy/activity	Mechanism of change	Influence on policy mix
Problem broker	Enschede: Fietzersbond	Creating awareness; altering problem perception using indicators	Replacement (Facilitating political shift)	Enhanced consistency
	Zwolle: Fietzersbond	Issue framing; relaying policy feedback	Drift prevention	Reinforced consistency
Political entrepreneur	Enschede: Alderman	Politicizing cycling; signaling commitment; allocating funding	Replacement	Restored credibility
Process broker	Zwolle: Bureaucrats	Persuasive framing; institutionalizing ideas; linking policy mix to other domains; connecting stakeholders	Conversion (Repurposing other agendas); drift prevention	Strengthened coherence
Program champion	Zwolle: Bureaucrats	Operationalizing design; overseeing delivery	Drift prevention	Strengthened coherence

Note: The specific role of policy entrepreneur was less distinct in these cases, although some of its activities were visible in the working of the process brokers, problem brokers, and program champions.

organization with semi-autonomous municipal branches—played a significant role in problem brokering at the local level. Its activities demonstrate how a national actor can influence local policymaking by creating awareness, brokering knowledge, and legitimizing municipal action through benchmarking and advocacy. Had we analysed the evolution of the vertical policy mix, it is plausible—even likely—that national-level policy entrepreneurship would have featured more prominently, especially given the supportive institutional environment for cycling in the Netherlands.

The cases also shed light on the different mechanisms through which policy mixes evolve. In Enschede, political entrepreneurship was associated with two episodes of replacement: first unfavourable, as cycling lost political support after 2000, and the second favourable, as political leadership re-established ambitious objectives and policy instruments. In Zwolle, by contrast, process brokering prevented drift by keeping cycling embedded in broader municipal strategies and enabled conversion by repurposing resources from emergency planning and housing construction to finance cycling infrastructure. These findings suggest that different types of entrepreneurship might be linked not only with variation in mix characteristics but also to distinct mechanisms of institutional change.

5.2. Propositions on the influence of policy entrepreneurship on policy mixes' characteristics

Based on the findings, we formulate exploratory propositions on the role of policy entrepreneurship in shaping the characteristics of policy mixes. Neutral framing is employed to acknowledge the potential for both positive and negative influences, reflecting the variability in actor motivations, strategies, and impacts in diverse contexts. This was, in fact, observed in Enschede where the first episode of replacement by the alderman undermined credibility and consistency of the cycling policy mix. The first set of propositions highlight how distinct types of policy entrepreneurship primarily influence the credibility (P1), consistency (P2), and coherence (P3) of policy mixes, drawing on both case evidence and the broader literature. The second set highlights how the interplay among different types of entrepreneurs can result in specific mechanisms of institutional change and—thereby—shape policy mix characteristics (P4–P6).

- **P1:** Political entrepreneurs especially influence the credibility of policy mixes through their ability to signal and sustain political commitment.
- **P2:** Problem brokers or policy entrepreneurs primarily influence the consistency of policy mixes by framing societal conditions or advancing policy alternatives, which may or may not align with policy objectives and instruments.
- **P3:** Process brokers or program champions primarily influence the coherence of policy mixes by steering processes of policy formulation and implementation or by supporting—or undermining—the implementation of policies in line with policy design and intent.
- **P4:** The interplay of political entrepreneurs and problem brokers or policy entrepreneurs facilitates replacement by aligning political capital with issue framing or alternatives specification, thereby influencing the credibility and consistency of policy mixes.
- **P5:** The interplay of problem brokers and process brokers or program champions prevents drift or facilitates conversion by adapting implementation to user needs, thereby influencing the consistency and coherence of policy mixes.
- **P6:** In the absence of systemic problem reframing or appropriate alternatives, the interplay of political entrepreneurs and policy entrepreneurs or problem brokers can result in layering, potentially undermining the consistency of the policy mix.

Together, these propositions provide a framework for understanding the role of policy entrepreneurship in shaping policy mixes and offer a foundation for future empirical studies aimed at exploring these dynamics in diverse contexts.

5.3. Limitations and future research

While this study offered insights into the relationship between policy entrepreneurship and the evolution of policy mixes, it suffers from three key limitations. First, the focus on cases of success inherently introduces the potential for success bias. By examining municipalities that achieved notable improvements in their cycling climate, we found that policy entrepreneurs positively influenced policy mix characteristics. However, policy entrepreneurs may act in self-serving ways or contribute to ineffective or even counterproductive policy mixes. In fact, this was illustrated in the first episode of replacement in Enschede where the elected alderman prioritized public transport over cycling. Future research should, thus, examine less successful cases or instances of policy stagnation to explore whether and how entrepreneurial activities can lead to undesirable outcomes. This would provide a more balanced understanding of the dual-edged nature of policy entrepreneurship.

Second, the cultural and geographic context of the Netherlands shapes both the strengths and limitations of this study. On the one hand, the similarity in the geographic and institutional climate for cycling allowed us to 'control' for variation in external conditions. On the other hand, these favourable conditions might limit the applicability of the findings to other contexts. In regions where policy mixes are not supported by higher levels of government, policy entrepreneurs may find it more challenging to shape policy mix characteristics, even when employing similar strategies. Furthermore, the interplay among different policy entrepreneurs (for example, the use of knowledge by political entrepreneurs and process brokers) would likely be influenced by differing political and power dynamics in other settings. Comparative studies in diverse institutional contexts could shed light on these variations.

Third, the number of interviews was limited by the challenge of identifying and reaching key informants who had been directly involved in, or had closely observed, the policy process in the two municipalities. In addition, interviewees may have portrayed their own role in a more positive light, creating the risk of bias. Where possible, this was mitigated by triangulating with other sources, including additional interviews, policy documents, news reports, and secondary literature. However, this was not always possible

given the specialized knowledge that interviewees contributed. Future research could address this limitation by examining higher-profile cases with a broader range of actors across sectors, which would allow for further corroboration of findings.

Finally, while the broad temporal scope of this study (2000–20) enabled us to trace the long-term evolution of cycling policy mixes in two cases, it also constrained our ability to delve into specific changes in policy mix characteristics. This limitation makes it difficult to uncover the full spectrum of interactions and mechanisms mediating the relationships among exogenous conditions, feedback, entrepreneurial activities, and characteristics such as credibility, consistency, and coherence. Future research could adopt more focused approaches, such as event-based process tracing or temporal disaggregation, to examine the dynamics and influence of specific policy decisions on policy mix characteristics in greater detail.

6. Conclusion

This study examined the evolution of policy mix characteristics—mainly, credibility, consistency, and coherence—through a comparative analysis of the cycling policy mix in Enschede and Zwolle during 2000–20. The analysis revealed dynamic interdependencies between credibility, consistency, and coherence. In Enschede, the restoration of credibility after 2010 was pivotal in enabling improved consistency and coherence. Long-term political commitment, signalled through ambitious cycling objectives and adequate resources, created the conditions for problem brokers to facilitate alignment between policy objectives and instruments. Conversely, in Zwolle, sustained consistency and coherence reinforced credibility by demonstrating institutional reliability and delivering visible policy success. However, the limited comprehensiveness of both policy mixes constrained their ability to fully address systemic barriers, such as shifting travel behaviour from cars to bicycles, possibly hindering the transformative potential of these initiatives. These findings suggested that while feedback-driven entrepreneurial strategies can effectively enhance credibility, consistency, and coherence, achieving comprehensiveness might also depend on fostering such cross-sectoral, multi-actor coordination to address more systemic challenges. Building on these findings, the study formulated six propositions on how policy entrepreneurship shapes policy mixes and the mechanisms of institutional change therein.

The study makes four contributions to the literature on sustainability transitions and policy studies. First, we contribute to research on policy mixes by highlighting the influence of policy entrepreneurship in shaping mixes' credibility, consistency, and coherence. By demonstrating that policy entrepreneurship, through its activities, influences how policy mixes evolve in response to exogenous conditions, policy dynamics, and sociotechnical feedback, we extend the co-evolutionary framework of policy mixes to account for the role of agency (Edmondson et al., 2019). In doing so, we advance a more actor-centric understanding of policy mix evolution, addressing a key limitation in the existing literature, which often emphasizes institutional and structural determinants of these processes (Kern et al., 2019).

Second, we contribute to the ongoing discussion on the role of actors and politics in shaping sustainability transitions. Building on Kingdon (1984) and Bjerkan and Seter (2021), we show the relevance of the concept of policy entrepreneurship for understanding the influence of actors on transition trajectories. Our findings illustrate how problem brokers (Knaggård, 2015, 2016), political entrepreneurs (Roberts and King, 1991), and process brokers frame societal issues, signal political commitment, and navigate the complexities of policy formulation and implementation to influence sociotechnical outcomes. Thus, the typology of policy entrepreneurship we use can incorporate diverse actors involved directly or indirectly in policymaking or implementation in sustainability transitions, including—but not limited to—knowledge organizations, politicians, government entities, organized interests, and citizens (Goyal et al., 2020).

Third, as the typology of entrepreneurship used here is derived from the multiple streams framework, the findings point towards extending the framework's application. While the multiple streams framework has often been applied to study agenda-setting or policy change in the instance of a single policy and over a limited time-frame, our findings demonstrate that, in combination with the notion of policy feedback, its concepts—such as policy entrepreneurship, problem framing, and windows of opportunity—may also help explain the long-term evolution of policy mixes (Goyal et al., 2021). Future research could build on this by further developing and applying the multiple streams framework to longitudinal analysis of policy mixes, examining how entrepreneurship sustains or re-directs policy pathways in sustainability transitions.

Fourth, this study contributes to the ongoing cross-fertilization between policy studies and transition studies. Despite their relevance for studying sustainability transitions, lenses from policy studies are hardly used in such research (Kern et al., 2019). Recent literature has attempted to bridge this gap, for example, by drawing on policy process theories to explain transition dynamics (Kern and Rogge, 2018). Simultaneously, research on policy dynamics has also begun to address limitations with the applicability of policy process theories to complex sociotechnical environments, for example, by accounting for the influence of technological innovation in policymaking more explicitly (Goyal et al., 2021; Schmidt and Sewerin, 2017), studying long-term transitions that involve multiple policy changes (Derwort et al., 2021), and focusing not only on policy outputs but also outcomes (Goyal, 2021). This study furthers the synthesis by demonstrating the relevance of policy entrepreneurship to the study of the cycling transition in the Netherlands.

Declaration of generative AI

During the preparation of this work the authors used ChatGPT to improve the readability and language of the manuscript. After using this tool, the authors reviewed and edited the content as needed and take full responsibility for the content of the published article.

CRedit authorship contribution statement

Pavan Narayana Reddy: Methodology, Investigation, Conceptualization. **Nihit Goyal:** Writing – review & editing, Writing – original draft, Supervision, Methodology, Conceptualization. **Wijnand Veeneman:** Writing – review & editing, Supervision, Conceptualization.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Data availability

The data that has been used is confidential.

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