

Unraveling Sustainability Transitions, Path Creation, and Opportunity Space for Sustainable Development Policy A Conceptual Literature Review

Explorando la Transición hacia la Sostenibilidad, la Creación de Trayectorias y los
Espacios de Oportunidad para la Política de Desarrollo Sostenible
Una Revisión Conceptual de Literatura

Daniel Avendaño-Leadem¹

 <https://orcid.org/0000-0001-8097-3942>

Fecha de recibido: 29 de enero 2024; Fecha de corregido: 8 de mayo, 2024;

Fecha de publicación: 25 de junio, 2024

Abstract

This conceptual literature review explores the nuanced terrain of sustainability transitions, path creation, and opportunity space within the theoretical framework of evolutionary economic geography. Grounded in the foundational principles of this field, which examines the spatial and temporal dynamics of economic evolution, the paper applies a systematic approach to meticulously select and analyze twelve scholarly articles dated from 2010 or after. The methodology involved the creation of a comprehensive database organizing and systematizing the relevant data, so offering a robust foundation for the exploration of theoretical approaches and constructs related to sustainability transitions, path creation, and opportunity space. Drawing from the field of evolutionary economic geography, the paper emphasizes key contributions from this theoretical perspective. A common thread identified across these concepts is the pivotal role of change agency. The paper concludes by underlining the contributions of sustainability transitions, path creation, and opportunity space to sustainable development policy, providing insights into their potential impact on shaping a more sustainable and resilient future.

Key words: change agency; evolutionary economic geography; opportunity space; sustainable development policy.

Resumen

Este artículo explora las complejas temáticas de transición hacia la sostenibilidad, creación de trayectorias y espacios de oportunidad dentro del marco teórico de la geografía económica evolutiva. Basándose en los principios esenciales de este campo, que estudia las dinámicas espaciales y temporales de la evolución económica, el documento elige y analiza detalladamente doce artículos académicos fechados a partir de 2010 mediante un enfoque sistemático.

¹ Académico de la Escuela de Ciencias Geográficas de la Universidad Nacional, Costa Rica. Geógrafo con maestrías en University of Greenwich, Inglaterra y HafenCity Universität Hamburg, Alemania. Doctorando en Política Económica por el CINPE-UNA. daniel.avendano.leadem@una.ac.cr.

La metodología implica la creación de una base de datos integrada para organizar y sistematizar datos relevantes, brindando una base sólida para explorar enfoques teóricos y construcciones relacionadas con la transición hacia la sostenibilidad, la creación de trayectorias y los espacios de oportunidad. Tomando como referencia el ámbito de la geografía económica evolutiva, el documento resalta contribuciones clave desde esta perspectiva teórica. Un hilo común identificado en la discusión de estos conceptos es el papel decisivo de la agencia del cambio. El documento concluye subrayando las contribuciones de estos conceptos a la política de desarrollo sostenible, proporcionando perspectivas sobre su impacto potencial en la configuración de un futuro más sostenible y resiliente.

Palabras clave: espacios de oportunidad, agencia del cambio, geografía económica evolutiva, política de desarrollo sostenible

1. Introduction

Sustainable development, a pressing global concern, has garnered considerable attention in academic literature within the realm of economic geography, a field that uniquely considers the spatial dimensions of socio-economic processes. The dynamic interplay between sustainability transitions, path creation, and opportunity space reflects the recognition that achieving sustainable development necessitates fundamental transformations in technologies, industries, and lifestyles. The focus of evolutionary economic geography on comprehending the evolution of economic spaces aims to enhance understanding of the way transformative processes unfold in diverse geographical contexts, providing greater depth to the examination of sustainability challenges and solutions. This conceptual literature review situated within the field of evolutionary economic geography aims to explore the key frameworks and emerging themes related to the three terms—sustainability transitions, path creation, and opportunity space—with the overarching goal of understanding their interconnectedness and their implications for sustainable development policy.

Scholars in innovation studies have focused extensively on sustainability transitions (Truffer & Coenen, 2012), but only recently has scholarly attention turned to the spatial dimensions of these (Coenen et al., 2012). The geographical aspect of sustainability transitions, which emphasizes place specificity and the geography of inter-organizational relations, introduces a novel perspective (Hansen & Coenen, 2015). This review aims to synthesize and reflect upon the theoretical and empirical insights of this evolving geography of sustainability transitions literature.

Path creation, a concept related to the emergence of new growth trajectories, is intricately linked to sustainability transitions in shaping innovative trajectories that navigate towards sustainable regional development paths, highlighting the interplay between human agency, network dynamics, and policy interventions. Path creation emphasizes the distributed and emergent agency occurring in constituting phenomena, so challenging traditional notions of path dependence (Garud et al., 2010). The evolving policy landscape accentuates the critical role of policy models that go beyond neoliberal approaches, advocating for more proactive and systemic interventions to foster sustainable regional development paths (Binz et al., 2016).

Building on the idea of path creation, the literature emphasizes the role of human agency and network dynamics in the establishment of new economic development paths. Similarly, stress is made on the inter-temporal nature of agency and the need to take experiences and expectations into account in understanding path creation processes (MacKinnon et al., 2019; Huggins & Thompson, 2022). These discussions assist understanding of the nuanced interplay between path-dependent forces and agentic processes in shaping regional development paths (Steen, 2016).

The novel concept of opportunity space is introduced to bridge the gap between structure and agency, framing how actors perceive and utilize opportunities in regional development trajectories (Grillitsch & Sotarauta, 2020). Opportunity space encompasses the range of possibilities and constraints within a given context, providing actors with a framework to identify and exploit openings for development. By understanding and strategically manipulating opportunity spaces, policymakers can foster environments conducive to sustainable economic growth (Kurikka et al., 2022; Rinkinen et al., 2023).

To structure this conceptual literature review, the methodology is first outlined, detailing the systematic approach employed to identify, select, and analyze relevant academic works. Following this, the conceptual framework is delineated, providing an overview of sustainability transitions, path creation, and opportunity space by synthesizing the key conceptual frameworks extracted from the literature. The subsequent section discusses the contributions of evolutionary economic geography to the conceptualization of sustainability transitions, path creation, and opportunity space, all within the context of sustainable development policy. Finally, the concluding remarks encapsulate the key findings and insights gleaned from the literature, offering reflections on the implications of these for policymakers, researchers, and practitioners engaged in the pursuit of sustainable development policy.

2. Methodology

To identify the key conceptual frameworks and emerging themes in the academic literature concerning sustainability transitions, path creation, and opportunity space in order to obtain a deeper understanding of their interrelatedness within sustainable development policy, twelve scholarly articles were carefully selected using a systematic approach involving the creation of a database organizing and systematizing the relevant data. The selection process prioritized articles that demonstrated comprehensive coverage of the relevant theoretical underpinnings and empirical evidence. The twelve articles were chosen due to their relevance to the topics being researched and their significant contributions to the overall understanding of the theoretical concepts and empirical applications within the field. Furthermore, their methodological rigor and the depth of analysis provided were taken into account, so ensuring that the synthesized insights would offer a robust foundation for this research.

The selection process began with an extensive search within peer-reviewed literature databases (i.e., Scopus and Science Direct), prioritizing articles that included the keywords “sustainability transition”, “path creation”, and “opportunity space”. Further refinement was achieved by narrowing the search to articles falling within the realm of Evolutionary Economic Geography (EEG), a key

subfield within the broader context of sustainability transition and sustainable development. EEG explores how economic activities and spatial patterns evolve over time through the interplay of institutions, innovation, and socio-economic processes within geographical spaces. Additionally, it is the subdiscipline within geographical sciences that has done most work on mapping and explaining the uneven geographical landscape of innovation and technological change (Truffer & Coenen, 2012), common factors amongst the chosen key words. Focusing on EEG thus facilitated insight into the practical and spatial dimensions of sustainability and sustainable development policy.

The temporal scope of 2010 to 2023 was selected not only to capture the most recent developments in the field, but also in response to the pattern identified of an increase in relevant publications during this period, as evidenced by the Scopus search. This timeframe aligns with the emergence and evolution of the contemporary concepts being discussed, offering a valuable vantage point for understanding their trajectory and impact on sustainable development policy.

In the initial selection phase, over thirty articles were gathered for their relatedness to the key concepts “sustainability transition” and “path creation”. This process involved utilizing search engines such as Science Direct, Google Scholar, and Sage Journals to identify relevant literature. The evaluation of articles for inclusion was based on criteria including abstracts, keywords, authorship, academic journal impact, citation counts, and connectedness with the overall research theme. Given the relative novelty of the concept “opportunity space”, which has only recently gained attention in academic discourse, a smaller set of five articles was chosen to ensure that the review encompassed the most up-to-date perspectives.

The final selection comprised twelve articles, distributed as follows: four relating directly to “sustainability transitions”, five focusing on “path creation”, and three discussing “opportunity space”. A database was constructed recording the essential information from these articles (i.e., title, year, authors, journal, general theme, keywords, abstract content, etc.), so facilitating their organization and serving as a foundational resource for subsequent discussions. This methodology was purposefully designed to examine the interplay between sustainability transitions, path creation, opportunity space, and their collective influence on sustainable development policy within the realm of economic geography, seeking a comprehensive, timely, and relevant perspective on these interrelated concepts.

3. Exploring theoretical approaches and constructs

Within the dynamic landscape of evolutionary economic geography, the concepts of sustainability transition, path creation, and opportunity space have emerged as crucial frameworks, providing profound insights into transformative change and spatial development. This segment of the conceptual literature review explores the intricate interplay of these interconnected concepts within the framework of evolutionary economic geography. Table 1, depicting the topics and sub-topics identified in the literature consulted, serves as a visual guide to the comprehensive analysis conducted in this study.

Table 1. Topics and sub-topics identified in the literature review

<i>Economic sub-area</i>	<i>Topics</i>	<i>Subtopics</i>
	Sustainability Transitions	<i>Geographical Dimensions</i> : Focus on space as a social construction, relational perspectives, and spatial contexts in sustainability transition.
		<i>Regional Approach</i> : Understanding socio-technical and spatial institutional contexts within regions, addressing governance challenges and opportunities.
		<i>Power Dynamics</i> : Addressing political aspects, governance conflicts, and negotiations among various actors in sustainability transition projects.
Evolutionary Economic Geography	Regional Path Creation	<i>Policy Formulation</i> : Emphasizing the role of policies and multilevel governance including formal governmental policies and informal localized institutions in driving effective sustainability transitions.
		<i>Historical Inertia and Lock-In</i> : The persistence of established patterns and structures that make it difficult for systems to deviate from pre-existing paths due to self-reinforcing mechanisms.
		<i>Drivers of Change</i> : Emphasizing indigenous path creation, heterogeneity among agents, technology, institutions, and social networks as key mechanisms influencing path creation
	Opportunity spaces	<i>Key Resources</i> : Highlighting knowledge, niche markets, financial investment, and legitimacy as integral resources for shaping and sustaining new trajectories.
		<i>Facilitating Elements</i> : Regional and extraregional assets, economic, social, and institutional actors, mechanisms of path creation, market construction, and institutional environments for stimulating distinct growth trajectories
		<i>Region-specific opportunity space</i> : Factors unique to a particular area, such as industrial structures, institutional environments, etc.
		<i>Time-specific opportunity space</i> : Focuses on possibilities at a specific moment, acknowledging temporal variations in opportunities.
		<i>Agent-specific opportunity space</i> : Considers the sensitivity of opportunities and actors' ability to exploit them.
		<i>Perceived opportunity space</i> : Involves mental representations, world views, and regional imaginaries influencing opportunity perception.

Source: Own elaboration based on this literature review.

3.1 Sustainability transitions

In the pursuit of understanding and facilitating sustainability transitions, this segment explores the insights gained from the references consulted, spanning topics such as the geographical dimensions of sustainability transitions, the role of evolutionary economic geography in the interpretation of this

concept, the importance of a regional approach to such transitions, and the formulation of effective policies to guide and accelerate the transformative journey towards sustainability.

A sustainability transition encapsulates a fundamental societal transformation in economic practices and spatial configurations, departing from traditional resource-intensive approaches to embrace a comprehensive paradigm prioritizing ecological resilience, social equity, and economic prosperity (Truffer & Coenen, 2012). This profound shift involves the reorganization of critical sectors, including energy, transportation, and agriculture, accompanied by changes in governance structures and cultural norms, all aimed at addressing environmental degradation, promoting social well-being, and building economically resilient systems. From an economic geography standpoint, the emphasis lies on unraveling the spatial dimensions of this transition, exploring the redistribution of industries, the adoption of sustainable technologies, and the emergence of new economic activities that contribute to the development of sustainable and resilient landscapes (Coenen et al., 2012). The integration of environmental responsibility, social inclusivity, and economic sustainability underscores the intricate nature of sustainability transitions, necessitating collaborative endeavors, innovative solutions, and a steadfast commitment to achieving a harmonious balance among diverse and interconnected objectives, so steering society toward a more sustainable and equitable future.

The articles reviewed in the field of sustainability transitions unanimously emphasize the critical relevance of considering geography within discourse on this topic. Geography is portrayed as integral to understanding sustainability transitions, challenging the traditional positivist notion of space as an empty container and emphasizing the need for a relational perspective that recognizes space as a social construction shaped by interactions between actors (Hansen & Coenen, 2015). This acknowledgement becomes even more pressing given ongoing globalization marked by hypermobility and time-space compression due to technological advancements (Harvey, 2006). The literature consulted reveals historical oversight in the treatment of spatial dimensions within transition analyses, where the focus on long-term trajectories and historical treatment has led to the neglect of socio-spatial relations and dynamics. The failure to account for where transitions take place and the socio-spatial contexts within which they unfold results in a lack of comparability between different locations, hindering the development of a coherent body of theory (Coenen et al., 2012). In response to this gap, recent studies advocate for a relational perspective in sustainability transition analyses, emphasizing the importance of spatial contexts, proximity, and the intricate networks and relationships that define and create spaces within specific territorial locations. This shift is crucial as it addresses the institutional embeddedness of socio-technical development processes within specific territorial spaces and advocates for a multi-scalar conception of socio-technical trajectories (Coenen et al., 2012). The references consulted all highlight the idea that understanding the spatial dimensions of sustainability transitions is not only necessary but urgent, particularly in explaining the geographical unevenness of transition processes and dispelling the naïve notion that sustainability transitions can occur anywhere.

With regards to scale, approaching sustainability transitions from a regional perspective is crucial as this allows for a nuanced understanding of the interplay between socio-technical and spatial institutional contexts, acknowledging the substantial degree of conjunction and potential divergence

across regions (Truffer & Coenen, 2012). Regional studies literature emphasizes the importance of fluid and entrenched socio-technical configurations, providing a valuable framework to comprehend the specific governance challenges and opportunities implicated in regional transformation processes for sustainability concerns (Hansen & Coenen, 2015). By adopting a multilevel governance perspective and incorporating notions of niche and regime, the regional approach enriches the discussion, shedding light on the spatial distribution of innovation, production, and consumption in emerging greentech industries, thereby avoiding a biased focus on mature industry structures and facilitating more comprehensive transformations at both local and global scales (Mintrom & Rogers, 2022).

To complete the discussion on sustainability transitions, the literature review emphasizes the importance of addressing, in a way that respects the boundaries of natural systems, the power issues inherent in these intrinsically political projects that shape future living conditions globally and according to the boundaries of natural systems (Truffer & Coenen, 2012). The governance of sustainability transitions involves multiple policy areas and is subject to negotiations among various public, quasi-public, and private actors, leading to conflicts and struggles in urban and regional policies (Mintrom & Rogers, 2022). These policies often aim to combine ecological goals with economic competitiveness, focusing on green growth and stimulating the development of cleantech industries. Moreover, the role of informal localized institutions, including norms and values, is recognized as crucial to sustainability transitions, influencing the development and diffusion of environmental innovations (Coenen et al., 2012). Leadership is further identified as fundamental to driving sustainability transitions, with an emphasis on clarifying problems, engaging stakeholders, securing support, establishing monitoring tools, fostering relationships, and developing supportive narratives (Mintrom & Rogers, 2022). The integration of these policy perspectives is seen as essential to effective sustainability transitions, and should be taken into account both by formal governmental policies and informal localized institutions.

3.2 Path creation

To understand path creation, it is imperative to first consider its origin in path dependence theory which posits that historical trajectories and past events significantly shape current economic structures and spatial patterns (Garud et al., 2010). From this basis, recognizing the persistence of historical choices and events helps elucidate the way certain regions or industries develop unique paths over time (Binz et al., 2016; Steen, 2016). Consequently, path creation theory, which investigates the processes through which new economic trajectories and spatial configurations emerge, is intricately linked to path dependence. Understanding the effects of historical inertia (the persistence of established patterns or structures that make it difficult for systems to deviate from pre-existing paths) and lock-in (the idea that once a certain trajectory is chosen, there are self-reinforcing mechanisms and network effects that make it challenging to shift to alternative paths), both inherent to path dependence, provides insights into the constraints and opportunities for path creation (Garud et al., 2010). By appreciating the legacy of past choices and the entrenched nature of certain economic paths, scholars and policymakers can better discern the dynamics that influence the emergence of novel economic pathways, ultimately

facilitating more informed decisions for fostering sustainable economic development and spatial transformation (MacKinnon et al., 2019). In essence, a symbiotic comprehension of path dependence and path creation theories enriches understanding of the intricate interplay between historical legacies and the potential for innovation and transformation in economic geography.

As deduced from the literature consulted, path creation refers to the process by which regions or industries develop new and unique trajectories, often driven by innovation, entrepreneurship, and institutional changes, leading to the formation of distinct economic paths or development patterns. It involves the emergence of novel activities, technologies, or organizational structures that set a region or industry on a distinctive and evolving economic course. Path creation is a dynamic concept that encompasses the interplay of temporal dimensions – the past, the present, and the future. The term “path” invokes a historical trajectory, yet path creation goes beyond merely repeating or avoiding past occurrences. Instead, actors strategically mobilize historical experiences not as rigid constraints, but as a wellspring for the generation of innovative options (Garud et al., 2010). This forward-looking perspective is encapsulated in the term “creation”, emphasizing the proactive and anticipatory nature of the process. Path creation, therefore, involves the iterative construction of novel trajectories, leveraging the past to inform present actions and shape future outcomes (MacKinnon et al., 2019). It is a continual process of envisioning and implementing transformative strategies that break away from established patterns, fostering adaptability and resilience in the face of evolving economic landscapes.

In practical terms, path creation unfolds as an iterative construction process driven by networks of diverse actors collaborating to shape regional development. These actors engage in collective endeavors to establish new market segments, define user profiles, adapt regulations, lobby for subsidies, and set technical standards (Huggins & Thompson, 2022). The objective is to collectively create an environment conducive to the emergence and prosperity of a new industry within a region. Crucially, path creation is not triggered by external shocks but is propelled by the strategic agency of heterogeneous actor groups (Steen, 2016). These actors collaboratively act upon existing locked-in structures, mobilizing resources to instigate transformative change and foster the conditions for the development of innovative industries. In essence, path creation is a proactive and collective effort to shape the economic future of a region through strategic interventions that transcend traditional trajectories (Huggins & Thompson, 2022). Martin and Sunley (2006) contributed to this understanding by identifying key mechanisms or drivers of change, emphasizing the importance of indigenous path creation, heterogeneity among agents, technology, institutions, and social networks, as well as other regional de-locking scenarios. These mechanisms collectively underscore the idea of path creation as a dynamic and ongoing process rather than a static outcome.

Based on their discussion emphasizing path creation as a process of resource alignment and anchoring, Binz et al. (2016) propose a series of key resources to be considered as integral components in the complex phenomenon of path creation. In this schema, knowledge, encompassing explicit, tacit, experience-based, and network-based dimensions, stands at the core of path creation processes, acting as a decisive mechanism for firms to establish and sustain competitiveness. Additionally, niche markets are recognized as valuable resources, especially when actors must actively create markets for innovative

technologies or products. Financial investment emerges as a key and often scarce resource, mobilized from various sources including angel investors, venture capital, and government organizations, particularly in the uncertain early phases of industry formation. Legitimacy is also seen as crucial, requiring alignment with relevant institutional contexts to gain acceptance and overcome skepticism. The formation processes of these four resources involves the intricate interplay of relevant actors, networks, and institutions, whilst their systemic alignment plays a pivotal role in shaping the trajectory of path creation. These proposed qualitative indicators serve as rough measures of the intensity of early alignment processes (Binz et al., 2016).

For their part, MacKinnon et al. (2019) established that path creation depends on the articulation of five elements that stimulate a region's distinct trajectory of growth at a particular point in time (regional and extraregional assets; economic, social, and institutional actors; mechanisms of path creation; market construction; and institutional environments). These elements facilitate regional path creation through three primary interactions. Initially, within specific institutional environments, key actors strive to identify, utilize, and enhance both regional and extraregional assets. Subsequently, the establishment of paths relies on these actors effectively aligning or strategically combining these assets with their associated markets through generative mechanisms, such as diversification, indigenous path creation, and transplantation. Lastly, the crucial momentum for path growth stems from the process of aligning or strategically coupling regional and extraregional assets with these mechanisms, a synergy reinforced significantly by the operation of agglomeration economies (MacKinnon et al., 2019).

Path creation depends on groups of entrepreneurs, spin-off ventures, diversified companies, and other actors who strategically blend and exchange knowledge and resources from various sectors, while pursuing new and anticipated opportunities (Steen, 2016). By recognizing the legacy of past choices and entrenched economic paths, scholars and policymakers can make more informed decisions for fostering sustainable economic development. Path creation depends on diverse actors strategically blending knowledge and resources, ultimately enriching the interplay between historical legacies and the potential for innovation and transformation in economic geography.

3.3 Opportunity spaces

The concept of opportunity space refers to a theoretical framework that focuses on the limits and possibilities for regional development in a specific geographical area at a particular point in time. The term was introduced by Grillitsch and Sotarauta (2020) as a means to explore the dynamic interaction between structural factors and the agency of actors in shaping regional development. It emphasizes understanding the way that specific structural elements influence the construction, perception, and exploitation of opportunities by actors in distinct places and times, while also acknowledging how these same actors contribute to the formation of new structures over time.

When applied in the context of regional development, opportunity space discussion involves examining the circumstances and structural preconditions that either constrain or enable the potential

for path development within a region. It takes a systemic view, aiming to support the analysis of the complex interplay between various factors that influence regional development. This includes aspects such as industrial structures, institutional environments, informal institutions, entrepreneurial climates, and knowledge networks (Kurikka et al., 2022). On integrating the components from the literature consulted, the notion of opportunity space can be categorized into four derivatives:

- *Region-specific opportunity space*: This encompasses factors such as the industrial structures, institutional environments, informal institutions, entrepreneurial climate, and knowledge networks that are specific to a particular region.
- *Time-specific opportunity space*: This focuses on possibilities within a specific point in time, recognizing that opportunities may vary over time.
- *Agent-specific opportunity space*: This considers the sensitivity of potential opportunities and the ability of actors to exploit these.
- *Perceived opportunity space*: This involves regional imaginaries, understandings of the future, perceptions, agreements, mental representations, and world views that influence how opportunities are perceived within a region.

Inspired by Massey's conceptualization of space, opportunity spaces are not mere empty containers, but rather emerge as products shaped by agents and their relationships within a specific temporal context, and are thus under continual construction (Massey, 2005). Consequently, it is essential not to view opportunity spaces as entities crafted by some and exploited by others. Instead, they should be perceived as evolving constructions, taking a particular form contingent upon the agents engaged in their development at a given time. Innovative entrepreneurs play a dual role in these dynamics: they are not only agents who exploit existing spaces and embedded opportunities, but they also actively contribute to the construction and configuration of opportunity spaces, utilizing their agent-specific knowledge bases as catalysts for shaping these environments (Rinkinen et al., 2023).

It is fundamental to consider whose opportunities are being taken into account when analyzing regional opportunity spaces. The status and agency of a region as a collective actor is not innate or pre-given. Regions constantly evolve as dynamic compositions of economic, social, and ecological factors. Rather than simply being the aggregate of individual actors' opportunity spaces, a regional opportunity space is more complex (Kurikka et al., 2022). As highlighted by Grillitsch and Sotarauta (2020), novel activities arise when the opportunities of individual actors intersect and intertwine, or when diverse industries connect through networks of regional specialization.

4. Contributions from evolutionary economic geography

Many of the literature sources consulted in undertaking this conceptual literature review alluded to EEG for its significant contributions to the discourse on sustainability transitions, path creation, and opportunity space. EEG has emerged as a distinct field, with recent theorizing in economic geography

focusing on the evolutionary nature of economic activities and their connection to processes of socio-spatial development and change. In its emphasis on evolution, EEG adopts a critical stance toward static analysis, seeking to explain the current state of affairs by delving into its historical development, strongly considering that the reason for the existence of something is closely tied to the process through which it transformed into its current state (Steen, 2016). A fundamental principle of this research is that development trajectories undergo path-dependent processes, implying that a given outcome evolves as a consequence of the system's own history and ongoing processes (Martin & Sunley, 2006).

To be more specific, the references consulted on the theme of sustainability transitions consistently recognize the valuable contributions of the EEG approach to interpreting discussions related to this concept. Both EEG and sustainability transition studies share a common ground in acknowledging the significance of path dependence and lock-in, considering these to be potential impediments to shifts toward more sustainable modes of production and consumption (Truffer & Coenen, 2012).

Moreover, the EEG perspective emphasizes the geographical distribution of organizational routines, highlighting the importance of historical path dependencies for future spatial development paths (Hansen & Coenen, 2015). This perspective is crucial to understanding regional variations and the potential for sustainable transformations, providing insights into the scope and extent of the variety creation needed to facilitate sustainable transformation processes.

The EEG approach thus draws attention to the historical and spatial contingencies that play a pivotal role when scrutinizing efforts and initiatives aimed at supporting more sustainable configurations in production and consumption (Truffer & Coenen, 2012). Additionally, by integrating an institutional perspective into transition analyses, EEG literature seeks to explore fundamental questions about how geographically uneven transition processes are shaped and mediated by institutional structures. This adds conceptual vocabulary to transition analyses, contributing to better contextualizing these within real spaces and providing a more nuanced understanding of the spatial unevenness of sustainability transition processes (Coenen et al., 2012). Overall, the EEG approach enriches sustainability transition discourse by emphasizing the interplay between historical, spatial, and institutional dimensions.

Furthermore, EEG plays a pivotal role in shaping the approach towards path creation by viewing it as a branching process emerging from a region's existing industrial structure and organizational routines. According to this perspective, the creation of new industries and activities occurs within windows of locational opportunity, with the actual whereabouts of path creation being relatively open, contingent upon fulfilling a set of generic conditions such as infrastructure and human capital (Binz et al., 2016). While the initiation of a new path is often attributed to "historical accidents", EEG underscores that these accidents are not truly random but are shaped by the economic, social, cultural, and institutional conditions inherited from a locality's previous industrial and technological histories. This perspective emphasizes the significance of place-specific factors and conditions that are integral to both industrial renewal and the development of new industries. However, it also acknowledges that these same factors can pose constraints on innovation and new path creation, as they may not easily adapt to or be applied in new circumstances (Steen, 2016).

EEG makes further valuable contributions to the discourse on opportunity space by enhancing the understanding of how agents, embedded in specific regional, industrial, and temporal contexts, navigate and shape their economic landscapes. The concept of opportunity space discussed above aligns with the evolutionary perspective, emphasizing the dynamic interplay between agency and structure. EEG explores the historical development and spatial dynamics of economic systems, shedding light on how actors within an opportunity space strategically deliberate on future possibilities (Grillitsch & Sotarauta, 2020). By considering the evolution of structures over time and the potential impacts of their actions, agents contribute to the unfolding of opportunities. This perspective recognizes that opportunities are inherently future-oriented and encapsulates the intricate relationship between change agency and the circumstances that make transformative actions feasible within a given opportunity space (Kurikka et al., 2022).

5. Change agency as a common element in the discussion

This literature review pertaining to sustainability transitions, path creation, and opportunity space identified a consistent emphasis on the pivotal role of agency, particularly change agency. In this context, human agency, as defined in *The Dictionary of Human Geography*, is construed as “the ability of people to act, usually regarded as emerging from consciously held intentions, and as resulting in observable effects in the human world” (Gregory et al., 2009, p. 347). In other words, agency refers to the capacity of individuals and groups to act and make purposeful choices in shaping their economic and environmental circumstances. Relatedly, change agency refers to the deliberate and influential role played by individuals or entities in driving transformative shifts within economic systems, shaping spatial patterns, and fostering sustainable development.

The importance of agency within sustainability transitions lies in the recognition that effective change agents, including policymakers, government officials, community leaders, and other entrepreneurial actors, play a pivotal role in driving and facilitating shifts towards sustainability (Mintrom & Rogers, 2022). Drawing from emerging studies, it becomes evident that change agents must possess leadership capabilities embedded in effective teams that can tap into diverse resources, knowledge, and networks (Hansen & Coenen, 2015). The success of sustainability transitions is closely tied to the actions undertaken by change agents. These actions have been classified into six key types as follows: clarifying problems and articulating shared visions; engaging stakeholders in solution identification; securing support from influential figures; establishing monitoring tools; fostering long-term relationships of trust; and developing narratives that sustain ongoing action (Mintrom & Rogers, 2022). The agency of change agents, through deliberate and systematic engagement in these actions, emerges as a critical factor in the success of sustainability transitions.

Within the realm of path creation, the concept of change agency holds paramount significance. Path creation processes are fundamentally rooted in human agency and the intricate dynamics of the networks through which these agents operate. The effectiveness of forging new paths hinges on the establishment of collective agency within strategic networks characterized by a shared commitment (Huggins & Thompson,

2022). Regions endowed with such agency and robust networks are better positioned to navigate the intricacies of economic complexity, fostering adaptability crucial to generating the innovation synonymous with new developmental trajectories. However, agents pursuing path creation confront a myriad of intentions from various actors, both internal and external to the region. These agents grapple with emergent forces beyond their control, as the intentional actions of many others collectively shape the growth path (Grillitsch & Sotarauta, 2020). A regional trajectory, therefore, emerges at the intersection of purposive and meaningful actions by numerous actors, giving rise to both intended and unintended consequences. In essence, change agency serves as the linchpin in the dynamic interplay of actors and forces driving the creation of novel paths (Huggins & Thompson, 2022; Grillitsch & Sotarauta, 2020).

In their discussion on opportunity space, Grillitsch and Sotarauta (2020) highlight the importance of change agency within regional path development. They further propose what they call the trinity of change agency (innovative entrepreneurship, institutional entrepreneurship, and place-based leadership – see Table 2) as an approach to explain why some regions are more successful than others in their efforts to construct and exploit opportunity spaces. The trinity of change agency is rooted in geography, taking into account actions that exert influence in specific locations, such as regions. However, the concept also recognizes that not all actors are attentive to or affected by the spatial consequences of their actions.

Table 2. Types of change agency

<i>Type</i>	<i>Approach</i>
Innovative entrepreneurship	<i>Breaking with Tradition:</i> Innovative entrepreneurship involves actions aimed at breaking with existing norms and practices, establishing new approaches by creatively combining knowledge and resources.
	<i>Sustained Competitiveness:</i> It drives sustained competitiveness, exemplified by hidden champions, firms maintaining leadership in global market niches through continuous innovation over extended periods.
Institutional entrepreneurship	<i>Changing Institutions:</i> Institutional entrepreneurship involves actions and strategies aimed at altering existing institutions or introducing new ones.
	<i>Creating Opportunities:</i> It seeks to create new opportunities, such as supporting the development of new industries, by influencing the systems of rules (formal and informal) that enable and constrain actions and interactions within societies.
Place-based leadership	<i>Regional Development Coordination:</i> Place-based leadership involves coordinating regional development efforts by establishing common interests, mobilizing resources, and negotiating with actors across different scales.
	<i>Dependence on Collective Resources:</i> It recognizes that the innovativeness and growth of firms partially depend on leveraging regional collective resources such as education, research facilities, and infrastructure.

Source: Own elaboration based on Grillitsch & Sotarauta (2020) and Grillitsch et al. (2022).

6. Inputs towards sustainable development policy

The literature reviewed strongly suggests that the concepts of sustainability transitions, path creation, and opportunity space can enhance sustainable development policy significantly, influencing the contours of policy frameworks (see Table 3). These concepts can thus play a pivotal role in shaping transformative initiatives aimed at fostering a sustainable future. Change agency was additionally identified as a recurring theme in the literature consulted, and the role of agency-driven dimensions in advancing sustainable development policy is also a valuable factor to take into consideration.

The concept of sustainability transition can significantly contribute to the development of sustainable development policy in providing a conceptual framework for policymakers. Its definition underscores the interconnectedness of ecological resilience, social equity, and economic prosperity, offering a holistic perspective that policymakers can use to shape policies addressing environmental degradation, social well-being, and economic resilience (Truffer & Coenen, 2012). Moreover, emphasis on the reorganization of critical sectors and the spatial dimensions of the transitions sought can inform policymakers about the need to integrate sustainable technologies, redistribute industries, and foster new economic activities, thereby guiding the formulation of policies that support the development of sustainable and resilient landscapes (Coenen et al., 2012). Overall, the intricate concept of sustainability transition emphasizes the importance of collaborative efforts, innovative solutions, and a steadfast commitment to achieving a harmonious balance, so providing valuable insights for policymakers seeking to craft comprehensive and effective sustainable development policies.

Table 3. Contributions to sustainable development policy

<i>Conceptual framework</i>	<i>Key contributions</i>
Sustainability Transition	Provides a holistic perspective emphasizing ecological resilience, social equity, and economic prosperity. Guides policymakers in reorganizing critical sectors and addressing spatial dimensions of the transition. Emphasizes collaborative efforts, innovative solutions, and commitment for balanced and effective policies.
Path Creation	Considers temporal dimensions and leverages historical experiences. Identifies sustainable options by breaking away from unsustainable patterns. Promotes adaptability to evolving economic landscapes. Encourages proactive and anticipatory policy measures for future challenges.
Opportunity Space	Assists policy formation by identifying and addressing structural constraints and enabling factors within a specific geographical area. Enhances understanding of the interplay between actors, structural elements, and regional development dynamics. Contributes to contextually relevant and effective long-term sustainability.
Change Agency	Instrumental in shaping sustainable development policy. Requires collaborative leadership that transcends traditional hierarchies and navigates complexity through partnerships. Emphasizes the pivotal role of effective change agents in propelling the shift towards sustainability. Leadership capabilities of change agents critical for success of sustainability transitions.

Source: Own elaboration based on this literature review.



For its part, the dynamic nature of path creation, which considers temporal dimensions and strategically mobilizes historical experiences, allows for the identification of sustainable options based on past successes and failures. This forward-looking perspective helps policymakers envision and implement strategies that break away from unsustainable patterns, so promoting adaptability to evolving economic landscapes (MacKinnon et al., 2019). Additionally, the proactive and anticipatory nature of path creation emphasizes the need for policy measures that anticipate and address future challenges. This iterative construction of novel trajectories aligns with the goal of sustainable development policies, which seek to balance present needs with the preservation of resources for future generations, promoting long-term resilience and positive economic outcomes.

By leveraging the concept of opportunity space, sustainable development policies can be formulated by identifying and addressing the structural constraints and enabling factors within a specific geographical area, thus fostering a more nuanced understanding of the interplay between actors, structural elements, and the evolving dynamics of regional development, ultimately contributing to the creation of effective and contextually relevant strategies for long-term sustainability.

Change agency, embodied by government officials, community leaders, and industry advocates, is instrumental to shaping sustainable development policy. For any sort of sustainable development policy, it is essential that collaborative leadership is exhibited by change agents, as this transcends traditional hierarchies and navigates complexity through partnerships and leadership (Mintrom & Rogers, 2022). Effective change agents, which can include policymakers and public managers, assume pivotal roles in propelling the shift towards sustainability, mobilizing their agency towards driving transformative policies. The success of sustainability transitions hinges on the leadership capabilities of change agents, highlighting the need for effective teams that leverage diverse resources, knowledge, and networks (Hansen & Coenen, 2015). Consequently, the deliberate and systematic engagement of change agents becomes a critical factor in the formulation and success of sustainable development policies.

The ability to drive intentional and positive transformations within regional economic development requires a nuanced understanding of human agency, as it pertains to both individual and collective actions. Effectively executing change agency involves empowering individuals and communities to actively participate in shaping their economic landscape. By fostering a sense of ownership and responsibility, sustainable development policies can gain traction and evolve organically (Grillitsch et al., 2022). Moreover, anticipating and addressing future challenges necessitates a forward-looking approach that considers the dynamic nature of economic and environmental factors. This requires a strategic blend of adaptability and foresight, where policies are designed not only to meet present needs but also to proactively respond to emerging challenges, ensuring the long-term viability and resilience of developmental initiatives (Grillitsch et al., 2022). Integrating human agency into the core of sustainable development policies by taking into account the concepts of sustainability transitions, path creation, and opportunity space can thus be seen to be crucial to navigating the complexities of regional economic development and fostering a path toward a more sustainable and resilient future.

7. Conclusion

The academic exploration presented in this paper, grounded in evolutionary economic geography, unravels the intricacies of sustainability transitions, path creation, and opportunity space. Through careful analysis of twelve methodically selected scholarly articles, the theoretical landscape surrounding these concepts is navigated, shedding light on their contributions to our understanding of economic evolution. Emphasis is made on the commonality of change agency across these concepts, underscoring the dynamic role played by actors in shaping sustainable transitions. Importantly, by contextualizing these concepts within the framework of evolutionary economic geography, highlight is made of their potential impact on policy frameworks geared towards sustainable development. In charting a course towards a more sustainable and resilient future, this study seeks to contribute valuable insights, affirming the relevance of these concepts in shaping transformative pathways towards the harmonious coexistence of economic growth and environmental stewardship.

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Annex

Table 4. Academic articles considered in the literature review

<i>Area</i>	<i>Title</i>	<i>Author & date</i>	<i>Journal</i>
Sustainability Transition	Environmental innovation and sustainability transitions in regional studies	(Truffer & Coenen; 2012).	Regional Studies
	Toward a spatial perspective on sustainability transitions	(Coenen et al.; 2012)	Research Policy
	The geography of sustainability transitions: Review, synthesis and reflections on an emergent research field	(Hansen & Coenen; 2015)	Environmental Innovation and Societal Transitions
	How can we drive sustainability transitions?	(Mintrom & Rogers, 2022)	Policy design and practice
Path Creation	Path dependence or path creation?	(Garud et al.; 2010)	Journal of Management Studies
	Path creation as a process of resource alignment and anchoring: industry formation for on-site water recycling in Beijing	(Binz et al.; 2016)	Economic Geography
	Rethinking path creation: a geographical political economy approach	(MacKinnon et al.; 2019)	Economic Geography
	Human agency, network dynamics and regional development: the behavioural principles of new path creation	(Huggins & Thompson; 2022)	Regional Studies
	Reconsidering path creation in economic geography: aspects of agency, temporality and methods	(Steen, 2016)	European Planning Studies
Opportunity Space	Trinity of change agency, regional development paths and opportunity spaces	(Grillitsch & Sotarauta; 2020)	Progress in Human Geography
	Regional opportunity spaces – observations from Nordic regions	(Kurikka et al.; 2022)	Regional Studies
	University as an opportunity space enabler in a regional entrepreneurial ecosystem	(Rinkinen et al.; 2023)	European Planning Studies

Source: Own elaboration.