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Talent Attraction and Green Path Development: A Context and Agency (CAGE) Framework Analysis

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Abstract: *Emerging green industries often face talent-related challenges rooted in path dependencies from established sectors. This study uses qualitative secondary data analysis to examine how agency interacts with regional conditions to shape talent attraction in Finland's Vaasa region, using the emerging battery industry as an illustrative case. Drawing on Green Path Development and Talent Management literature, the study develops the Context and Agency (CAGE) interdisciplinary framework to examine how different forms of agency interact with contextual conditions in shaping talent-attraction processes. The findings show that regional authorities exercise enabling agency through place-based leadership and support for local initiatives. At the firm level, innovative entrepreneurship contributes to regional place branding but may constrain international talent attraction through stringent language requirements. Institutional entrepreneurship further shapes talent mobility through national immigration policies that define the broader regulatory environment. The findings offer implications for regions seeking to mobilize talent for Green Path Development.*

Keywords: Agency; Battery industry; Green Path Development; Nordic region; Talent Attraction; Talent Management; Finland

Introduction

The worsening climate crisis and ongoing environmental damage show that small reforms are no longer enough. This makes it clear that we need a major shift toward green transformation (Intergovernmental Panel on Climate Change, 2023). This kind of change means creating new industrial directions, or 'green paths,' that move our economic, technological, and institutional systems toward sustainability (Trippl et al., 2020). A central challenge is access to the skills and capabilities required for industrial transformation, prompting scholars to explore how regional assets can be modified to support industrial transformation (Firlus et al., 2023; Isaksen et al., 2020). Regional assets comprise the resources, capabilities, and conditions available within a region that support economic and industrial development. They encompass natural, infrastructural and material, industrial, human, and institutional assets, which may exist at both firm and regional/system levels (Trippl et al., 2020; Firlus et al., 2023). Asset modification

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refers to changes to this existing asset base that enable regions to develop new industrial paths or transform existing industries (Trippl et al., 2020). Such modification may involve reusing assets through recombination or redeployment, creating new assets through the establishment of new roles or recruitment of external talent, dismantling obsolete competencies through asset destruction, or combining new and existing assets to improve outcomes without fully replacing existing industries or workforces (Firlus et al., 2023; Eriksen and Frivold, 2023; Isaksen et al., 2019, 2020; Kyllingstad et al., 2021; Rypestøl et al., 2021; Steen and Karlsen, 2014; Trippl et al., 2020).

Recent research emphasizes the importance of understanding institutional and organizational dynamics across spatial scales in facilitating workforce adaptation (Dawley et al., 2025). Their studies suggest that green industrial transitions pose significant challenges to labor markets, and that local institutional and organizational contexts shape adaptation. Despite growing recognition of these challenges, empirical insights remain limited on how interactions among actors, institutions, and organizations enable workforce adaptation and system-level green transitions, particularly in regions with varying institutional capacities (Roessler, 2025). Indeed, understanding these dynamics is especially pertinent for peripheral or less-resourced regions, where structural constraints may intensify barriers to workforce development and talent mobility. This study develops the Context and Agency (CAGE) framework, elaborated in a subsequent section, to examine how different actors exercise agency within a given context to address talent challenges.

Talent is not a fixed characteristic with a single universally accepted definition but a multidimensional construct involving individuals' abilities and potential, demonstrated performance and value creation, and the context in which these capabilities are deployed (Vardi and Collings, 2023). Drawing on this broader understanding, this study conceptualizes talent as individuals and the skills, knowledge, and competencies they contribute to regional industrial development, and conceptualizes Talent Management (TM) as the strategic processes through which such talent is identified, attracted, developed, and retained. More specifically, this study conceptualizes talent attraction as the purposive recruitment of skilled individuals from outside a region or industrial sector to support the development of emerging green industries. This conceptualization draws on the TM literature, which emphasizes the strategic importance of attracting and managing highly skilled individuals for organizational development and competitiveness (Gallardo-Gallardo et al., 2015; Gallardo-Gallardo et al., 2020; Thunnissen, 2016), while extending these insights from the organizational to the regional context.

The Nordic battery industry considered an emerging green path (Okonkwo, 2024a, 2024b), provides a relevant sectoral context for examining workforce and structural challenges in Green Path Development (GPD) understood as developing economic activities, products, solutions, and technologies that contribute to environmental sustainability (Sotarauta et al., 2021, p. 93). National battery strategies underscore the central role of workforce development, skills provision, and competence building in energy transitions, with talent attraction emerging as one mechanism associated with supporting industrial development and shaping industrial

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trajectories (Adolfsson-Almqvist et al., 2019; Battery Norway, 2023; Fossil Free Sweden, 2020; Löfmarck et al., 2022; Ministry of Economic Affairs and Employment of Finland, 2021; Regjeringen.no, 2022; Viegand, 2022).

While talent attraction presents challenges across the battery industry, this study focuses on the Vaasa region in Western Finland, where workforce availability and skills development are important considerations in the emergence of the battery industry (Okonkwo et al., 2024), as well as the concentration of energy-technology firms and capabilities within the existing regional cluster (Vaasa.fi, 2025). These established regional capabilities may simultaneously provide resources for new path development and create forms of path dependency that influence the development of new competencies (Okonkwo, 2024a; Okonkwo, 2024b). These conditions highlight the dual need to attract new talent while reskilling incumbent workers to develop battery-specific expertise.

Vaasa is also a highly international and multilingual urban environment, with immigration contributing significantly to recent population growth (Vaasa.fi, 2024), and its strong presence of energy technology companies has positioned it as a central energy cluster and a significant contributor to the regional economy (Okonkwo, 2024b; Vaasa.fi, 2025). The EnergyVaasa also received the President of the Republic's Community Award of the Year as part of the Internationalization Awards, reflecting the collaborative character of the regional energy-technology network (City of Vaasa, 2024) and making the region a relevant empirical setting for this study. Because battery manufacturing was not yet fully operational in Vaasa at the time relevant to this study, the analysis focuses on anticipatory talent-attraction dynamics rather than realized sectoral employment. The guiding research question is How is talent attraction shaped by the interaction between agency and regional context in emerging green industrial paths? This question is approached through an interdisciplinary lens, integrating insights from the literatures on Talent Management (TM) and Green Path Development (GPD), culminating in the development of the CAGE conceptual framework. CAGE, an acronym for Context and Agency, is developed in this study to examine the relationship between regional context and agency. The concept of agency draws on the GPD literature, where agency concerns the purposive actions through which actors seek to influence regional development trajectories and contribute to changes in existing or emerging industries (Grillitsch and Sotarauta, 2019). Agency provides an analytical lens for examining the interplay between actors' agency and regional institutional and organizational contexts, helping explain how these factors jointly shape talent attraction processes. The paper proceeds with the conceptual framework, methodology, findings, and discussion.

Towards an inter-disciplinary conceptualization of talent attraction

Green Path Development as a regionally embedded process of agency

Green Path Development (GPD) can be understood as both a deliberate and evolutionary process through which regional actors mobilize existing assets, develop new capabilities, and create new development paths (Grillitsch and Sotarauta, 2019; Trippl et al., 2020). Path

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creation involves the emergence of new industrial activities based on novel combinations of knowledge, technologies, and resources (Grillitsch and Asheim, 2018). The Nordic battery industry offers a relevant example of an emerging green path, although research also highlights the importance of distinguishing between importing established industrial activities and genuinely creating new paths (Okonkwo, 2024b; Okonkwo et al., 2024). Global production networks and external corporate actors also strongly shape battery production, which can constrain regional agency (Näsman et al., 2026).

GPD can occur through different mechanisms, including path creation, path importation, and path diversification (MacKinnon et al., 2019; Trippl et al., 2017; Trippl et al., 2020). Path importation involves introducing activities, technologies, or firms from outside the region, whereas diversification builds on existing regional competencies and assets to enter related economic activities (Trippl et al., 2020; Sotarauta et al., 2021). These mechanisms show that green development does not necessarily require entirely new regional capabilities; it can also emerge by transforming and mobilizing existing assets. Regional assets relevant to GPD encompass natural, infrastructural and material, financial, industrial, human, and institutional assets (Baumgartinger-Seiringer et al., 2021). These assets are not static. Existing knowledge, competences, norms, and other regional resources accumulate over time and can generate both opportunities and constraints for future development, contributing to path dependence and potential lock-in (Eriksen and Frivold, 2023). At the same time, regional actors can modify and recombine assets to support industrial restructuring, cluster development, and the emergence of new development paths (Rypestøl et al., 2021; Firlus et al., 2023).

Asset modification is therefore an important mechanism through which regions can redirect existing capabilities toward new economic and technological activities (Trippl et al., 2020). This is particularly relevant to GPD, where existing industrial capabilities, infrastructure, knowledge, and institutional resources may provide foundations for emerging sustainable industries. GPD therefore involves not only attracting new firms or technologies but also adapting existing regional assets to changing environmental and economic opportunities. The regional context is particularly important in energy transitions. Regional industrial capabilities, institutions, resource endowments, policies, and market configurations can condition how energy transitions develop, while regional actors can also actively shape these processes through different forms of agency (Coenen et al., 2021). Human capital is particularly important, and although existing skills can facilitate diversification, their sectoral specificity may also contribute to path dependence in regional industrial development (Eriksen and Frivold, 2023). These dynamics indicate that talent's contribution depends not only on skill availability but also on how skills and competences interact with broader regional assets and institutional conditions. Agency provides the second central dimension of GPD. Grillitsch and Sotarauta (2019) conceptualize agency as intentional and meaningful action through which actors influence regional development paths, while recognizing that actions may produce both intended and unintended consequences. Agency is therefore exercised within broader structural and relational conditions rather than independently of them (Leca and Naccache, 2006). Different forms of agency can contribute to regional path development, including innovative

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entrepreneurship, institutional entrepreneurship, structural maintenance, and place-based leadership (Grillitsch and Sotarauta, 2019; Jolly et al., 2020; Sotarauta and Beer, 2017).

Innovative entrepreneurship involves developing and commercializing new products, technologies, or business activities, while institutional entrepreneurship concerns efforts to alter or create institutional arrangements that enable new development paths (Grillitsch and Sotarauta, 2019). Structural maintenance agency, by contrast, concerns actions aimed at maintaining existing structures, interests, or assets, which may constrain or support regional transformation depending on the context (Jolly et al., 2020). Place-based leadership refers to actors' capacity to mobilize resources, build coalitions, and influence development processes through locally embedded leadership and governance arrangements (Sotarauta and Beer, 2017). Together, the literature suggests that GPD emerges through the interaction between regional assets, contextual conditions, and different forms of agency. Regional development paths are neither fully determined by existing structures nor completely open to intentional intervention. Instead, actors operate within existing regional conditions while seeking to create, modify, and mobilize opportunities for new development paths (Grillitsch and Sotarauta, 2019; Trippl et al., 2020). This provides a useful foundation for examining how regions such as Vaasa can mobilize existing capabilities, attract new investment and talent, and develop the institutional and infrastructural conditions required for emerging green industries.

Talent attraction as contextually embedded agency

Talent is widely conceptualized as a strategically significant resource contributing to organizational competitiveness and the achievement of corporate objectives (Dries, 2013). In this sense, Talent Management (TM) extends beyond operational human resource practices and encompasses purposive, coordinated activities aimed at shaping organizational capabilities over time. According to Gallardo-Gallardo et al. (2020, p. 457), TM involves "activities and processes for the systematic attraction, identification, development, engagement, retention, and deployment of those talents which are of particular value to an organization to create strategic sustainable success," highlighting its strategic and intentional character. In this study, this intentional dimension is interpreted as a form of organizational agency. Much of the TM literature focuses on the organizational level; however, its insights can be extended to a regional context to inform the analysis of talent attraction in green industrial paths. TM is context-dependent because organizational context affects how TM is conceived, implemented, and developed (Gallardo-Gallardo et al., 2020). Consequently, TM practices cannot be assumed to be universally applicable, as organizational and societal contexts shape their design and effectiveness (Vaiman et al., 2018; Vaiman et al., 2017). At the macro level, national policies, cultural norms, institutional frameworks, and government involvement further influence how talent is managed and attracted across countries and industries (Khilji et al., 2015; Khilji and Schuler, 2017). Context, classically defined as "the surroundings associated with phenomena which help to illuminate those phenomena, typically factors associated with units of analysis above those expressly under investigation" (Cappelli and Sherer, 1991, p. 56), therefore provides conditions that can shape both opportunities and constraints for talent-related decisions.

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Institutional and organizational factors operate at multiple levels of TM. At the organizational level, strategy, structure, culture, workforce composition, leadership, and human resource practices influence how organizations define, identify, develop, and retain talent. At the institutional level, labor-market conditions, regulatory arrangements, societal norms, cultural expectations, and relationships with education and other institutions shape the broader conditions under which organizations implement TM (Gallardo-Gallardo et al., 2015; Gallardo-Gallardo et al., 2020). Accordingly, HR strategies must align with regulatory and normative frameworks (Paauwe and Boselie, 2003), while organizational contexts shape the development and implementation of TM practices (Cappelli and Sherer, 1991). For example, organizational sustainability practices can enhance organizational attractiveness and support talent attraction (Magbool et al., 2016). These conditions become particularly important in environments characterized by technological change, evolving workforce expectations, talent shortages, and broader socioeconomic transformations, which can intensify competition for skilled human resources (Gallardo-Gallardo et al., 2020; Bhalla et al., 2018). The multidisciplinary and collaborative nature of TM research further reflects the diversity of perspectives through which the field has developed (Gallardo-Gallardo et al., 2017).

Determinants of talent attraction therefore operate across external and internal domains. Externally, market dynamics and institutional frameworks, including regulatory regimes and policy infrastructures, influence recruitment strategies. Internally, organizational decisionmakers' discretionary choices, shaped by values, priorities, and interpretations of environmental pressures, influence strategic orientation and workforce composition, with implications for organizational learning and innovation (Cooke et al., 2014; Gallardo-Gallardo et al., 2020; Paauwe and Boselie, 2003). Research also indicates that TM practices and understandings of talent vary across national and organizational contexts, challenging universal approaches to TM (Cooke et al., 2014; Khilji and Schuler, 2017; Vaiman et al., 2018). Although much of the established TM literature remains centered on organizational contexts, scholars have highlighted the importance of examining contextual factors and actors beyond managerial perspectives (Gallardo-Gallardo et al., 2020; Sparrow, 2019; Thunnissen, 2016). This provides a basis for extending the analysis to the regional level, where talent attraction can be examined as a contextually embedded process shaped by wider institutional, economic, and organizational conditions.

CAGE as an interdisciplinary conceptual framework

This study develops CAGE, an acronym for Context and Agency, as an interdisciplinary conceptual framework integrating insights from Green Path Development (GPD) and Talent Management (TM). Although these literatures differ in their primary levels of analysis, both emphasize that human action is embedded in and shaped by contextual conditions. In TM research, organizational context influences the conception, implementation, and development of TM (Gallardo-Gallardo et al., 2020), while GPD research emphasizes that agency is exercised within regional, institutional, and structural conditions (Grillitsch and Sotarauta, 2019; Trippl et al., 2020). CAGE brings these perspectives together to examine how context and agency interact in talent attraction within GPD. In doing so, it provides a conceptual bridge

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between organizational and regional levels of analysis and supports examining agency under conditions of constraint and opportunity (Johns, 2017).

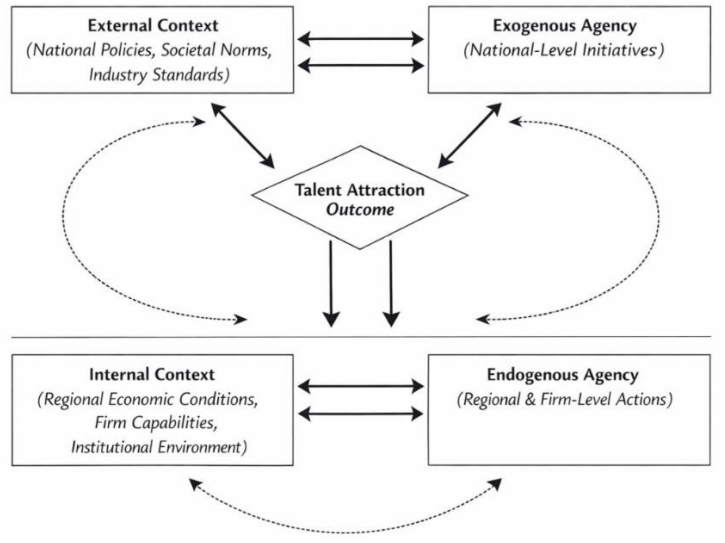


Figure 1. CAGE framework for talent attraction in GPD

As Figure 1 illustrates, CAGE conceptualizes talent attraction as emerging from the interaction between context and agency. Context shapes the opportunities, constraints, and resources available to actors, while agency refers to the purposive actions through which actors interpret and respond to these conditions. Agency is therefore understood as embedded and relational rather than independent of its surrounding context (Grillitsch and Sotarauta, 2019). Consistent with TM research, CAGE distinguishes between external and internal contexts while recognizing that these dimensions are interconnected (Gallardo-Gallardo et al., 2020). External context includes national policies, regulatory arrangements, societal norms, labor-market conditions, and wider industry developments. Internal context refers to regional economic conditions, institutional environments, and organizational capabilities and resources. These contextual dimensions interact with agency at different levels. National actors can influence the policy and regulatory environment, while regional and firm-level actors interpret these conditions and mobilize resources through strategies, collaboration, and institutional initiatives (Khilji et al., 2015; Grillitsch and Sotarauta, 2019; Trippl et al., 2020).

Within this study, the distinction between exogenous agency and endogenous agency is introduced as a conceptualization developed specifically for the CAGE framework. Exogenous agency refers to purposive actions by actors and institutions operating primarily at the national or broader external level. In contrast, endogenous agency refers to agency exercised by actors embedded within the regional and organizational context. This distinction is not an established categorization in the literature; rather, this study uses it analytically to clarify how agency operates across contextual levels. The two forms of agency are understood as interconnected,

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with external actors shaping the conditions within which regional and firm actors act. At the same time, regional and organizational responses may also influence wider institutional and policy conditions.

Talent attraction occupies a central position within CAGE as the process linking context and agency to the mobilization of human capabilities. It is therefore not treated solely as an HR activity but as a process with regional implications. Different configurations of context and agency may create different opportunities and constraints for talent attraction. For example, institutional arrangements may facilitate or constrain talent mobility, while actors may respond through leadership, coordination, employer positioning, or institutional entrepreneurship. These examples illustrate the framework's analytical logic rather than predetermined causal relationships. CAGE also incorporates a dynamic dimension. Context shapes the actions available to actors, while actors may, through their actions and interactions, help modify contextual conditions. This reflects the emphasis in GPD research on agency and opportunity spaces within regional development (Grillitsch and Sotarauta, 2019; Trippl et al., 2020), as well as TM research's recognition that contextual conditions influence the implementation and effectiveness of TM (Gallardo-Gallardo et al., 2020). Talent-attraction outcomes may consequently alter contextual conditions and shape subsequent strategies and forms of agency, creating an iterative relationship between context, agency, and talent attraction. Talent provides an important conceptual bridge between TM and GPD. In TM, talent is commonly understood as a strategically significant resource for organizations (Dries, 2013), while skills, knowledge, and human capabilities constitute relevant regional assets in processes of restructuring and path development (Trippl et al., 2020; Firlus et al., 2023). This shared emphasis enables examination of talent attraction across organizational and regional levels. Rather than treating talent attraction as a response to labor shortages, CAGE conceptualizes it as embedded in broader institutional, economic, and industrial conditions. This approach is consistent with broader calls to incorporate context systematically into organizational research (Johns, 2017).

Within CAGE, agency is therefore understood as intentional and purposive action exercised at organizational, regional, and national levels. Firm-level actors may exercise agency through recruitment, employer positioning, and workforce strategies; regional actors may mobilize institutional, infrastructural, and relational resources; and national actors may shape the wider policy and regulatory environment. The distinction between endogenous and exogenous agency developed in this study provides an analytical means of examining these interconnected levels without treating them as separate or independent processes. Overall, CAGE positions talent attraction at the intersection of context and agency. The framework examines how external and internal contextual conditions shape the scope for action, how actors respond strategically, and how those actions influence talent-attraction processes within GPD. In this way, CAGE connects TM's contextual emphasis with GPD's agency perspective. It provides the conceptual foundation for analyzing talent attraction in the regional development of the Nordic battery industry.

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Materials and methods

This study adopts a qualitative, theory-informing research design to examine how interactions between agency and regional context shape talent attraction in emerging green industrial paths. The analysis focuses on how public and non-public actors articulate, negotiate, and operationalize talent attraction strategies within a regional development context. The study treats discourse as both interpretive and performative, capturing how actors publicly construct meanings, justify strategies, and frame constraints and opportunities. It examines how actors communicate outcomes as part of broader sense-making processes in policy-facing environments.

The Vaasa region in Western Finland is selected as an empirical case due to its established energy technology ecosystem, emerging ambitions in the battery industry, and active regional governance in workforce and innovation policy. This study draws on qualitative secondary data combining policy and strategy documents with publicly available post-event discourse from a regional stakeholder forum. A systematic document analysis was conducted as an interpretive procedure to review and synthesize documentary evidence (Bowen, 2009). Policy reports and strategy documents recognized as authoritative sources on human capital development in the Nordic context were selected, including Adolfsson-Tallqvist et al. (2019), Battery Norway (2023), Fossil Free Sweden (2020), Löfmarck et al. (2022), Ministry of Economic Affairs and Employment of Finland (2021), Regjeringen.no (2022), and Viegand (2022). These materials were analyzed for recurring themes related to labor shortages, skills development, and talent mobility and synthesized into Table 1 to establish a comparative regional baseline.

Table 1. Talent-Related Challenges and Policy Insights across Nordic Countries

Country	Challenges	Key Insights from Documents	Document
Finland	Limited supply of skilled talent	Need to scale up industry-relevant skills	Ministry of Economic Affairs and Employment of Finland (2021)
Norway	Insufficient skilled workforce	Improve access to relevant expertise	Regjeringen.no (2022)
Sweden	Limited availability of skilled personnel	Invest in research and education for skills development	Fossil Free Sweden (2020)
Nordic comparison	Skills gaps in Li-ion battery knowledge and education capacity	Attract, train, and retrain workforce across the value chain	Adolfsson-Tallqvist et al. (2019); Battery Norway (2023); Löfmarck et al. (2022); Viegand (2022)

In addition, the study uses post-event material from a publicly accessible YouTube recording of an interdisciplinary session titled "International Talents and SMEs: An Evening of Solutions in the Spirit of Co-Creation," held during the Wasa Future Festival in Vaasa, Finland (Wasa Future Festival, 2023). The session brought together representatives from firms, regional

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authorities, entrepreneurs, and educational actors to foster a multi-actor discourse on talent attraction. The discussion provides publicly accessible, policy-facing material through which actors address labor market and regional competitiveness issues. Its performative character provides insight into how legitimacy, constraints, and solutions are framed within governance contexts. The data generate contextual and interpretive insights rather than statistical generalizations. The YouTube video material was manually transcribed and analyzed as textual data. Public and non-public actors were first categorized based on their organizational affiliation. They were then classified according to predefined agency types derived deductively from the theoretical framework, which guided the identification of the roles they performed in GPD.

The analysis combines deductive thematic and interpretive approaches (Naeem et al., 2023; Knoblauch and Schnettler, 2012) under the CAGE framework. The author iteratively reviewed materials to identify themes related to labor constraints, technological adoption, and policy responses. Deductive categories derived from GPD and TM literature structured the analysis, including place-based leadership, innovative entrepreneurship, institutional entrepreneurship, and socio-technical enablers such as artificial intelligence (AI). The interpretive analysis examined how these forms of agency interact with contextual factors, including labor-market structure, demographic change, immigration policy, and education systems. The analysis also examined how actors construct legitimacy, report outcomes (including workforce composition, digital engagement metrics, and policy effects), and frame constraints and opportunities. Across the dataset, the analysis explores how talent attraction links agency and context, highlighting how regional conditions both enable and constrain action while also being potentially reshaped through purposive strategies.

Findings

In line with the research question, participants described talent attraction not as a set of isolated practices but as an interaction between forms of agency operating across firm, regional, and system levels within Vaasa's regional context (see Table 2). These interactions produced both enabling and constraining dynamics for talent attraction.

Table 2. Actor-reported constraints and enabling actions for talent attraction

Speaker (actor)	Constraining Factors	Enabling Actions
Regional Authority (R)	Limited interdisciplinary strategies for talent attraction	Active regional government support for innovative initiatives to enhance talent attraction
Educational Institution (E1)	Underuse of emerging technologies, such as artificial intelligence (AI), in governance	Leverage AI for talent attraction, complemented by human expertise through stakeholder co-creation, and adopt digital workforce platforms

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Firm (F)	System-level constraints, including restrictive immigration policies, underutilization of social media for public engagement, an ageing workforce, limited English-language work documents, and insufficient support for the transition from study to work	Use social media to share stories and promote Finnish work culture, provide automatic pre- and post-graduation work permits for international students, relax language proficiency requirements for migrant recruitment, and offer language training and onboarding support
Local Entrepreneur and Educational Institution (L and E2)	Restrictive labor laws and limited initiative among immigrant job seekers hinder workforce adaptability	Implement less restrictive labour policies, improve accessibility and simplify market processes, and support strategic career choices by migrants that align with future market trends and opportunities

Place-Based Leadership

Participant from firms in the Vaasa region reported increasingly using place-branding strategies to attract talent, particularly through active social media engagement. The firm actor (F) noted that his company had reportedly amassed approximately 100,000 followers on TikTok and generated 58 million views on corporate videos. He explained that these platforms showcase Finnish work culture and its benefits, such as work-life balance and parental leave, through storytelling. Participants also emphasized that social media narratives highlight regional strengths, including efficient transportation systems and transitions from education to employment. According to the speaker, this visibility has generated hundreds of global job applications and thousands of expressions of interest from individuals considering relocation to Vaasa. The speaker further emphasized that the social and softer aspects of organizations are important to implementing TM. Complementing these firm-level initiatives, a regional actor (R) from the City of Vaasa described governmental involvement as critical to talent attraction. Participants highlighted that this commitment builds on a long tradition of attracting human assets to the region. For example, Finnish engineer John Wickström, after returning from Chicago, pioneered boat engine construction in Vaasa, helping lay the foundations of the energy cluster and enabling subsequent knowledge transfer and innovation. Today, participants described the region as facing the challenge of attracting skilled individuals who can contribute to the workforce and establish long-term roots in Vaasa. They described securing such talent as important to sustain established industries, foster emerging sectors, and support technological investment.

Innovative Entrepreneurship at the Firm Level

Firm participants reported that workplace diversity has gradually increased and currently stands at approximately 10%, which they described as broadly aligned with the regional average and as a significant improvement compared with five years ago. According to a firm actor (F), stringent language requirements remain a significant barrier to labor-market entry, as many skilled professionals with foreign backgrounds lack sufficient proficiency in Swedish

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or Finnish. Participants suggested that companies could consider more flexible language policies as a temporary measure, enabling international talent to enter employment while developing their language skills concurrently. Participants also emphasized the need for a middle-ground approach that provides employment opportunities to immigrants with limited language proficiency while supporting gradual language development. They noted that this approach remains uncommon, partly because safety documentation is not available in English. Progress was expected to be gradual, potentially over a decade, particularly as an aging workforce of approximately 10,000 increases pressure to reconsider recruitment policies. Additional measures included introducing short-term, easily accessible jobs, simplifying hiring procedures to reduce barriers for international talent, and expanding working-holiday visa agreements, including the recently signed agreement with Japan. These practices show how labor-market and institutional conditions shape firm-level responses.

Institutional Entrepreneurship at the System Level

Participants reported that restrictive government policies are perceived to constrain talent attraction. For instance, the firm actor (F) indicated that the current Finnish government had introduced a policy terminating residence permits for work-based migrants who remain unemployed for a few months (Daily Finland, 2025). Participants described such policies as creating an unfavorable environment for work-based immigration, potentially discouraging skilled professionals and increasing uncertainty among those already residing in Finland. Other participants, including a local entrepreneur (L), an educational researcher (E2), and the firm actor (F), similarly expressed concern that restrictive labor and immigration policies could divert skilled talent to alternative destinations perceived as more attractive. While Vaasa was described as offering a high quality of life, participants questioned whether the region could compete globally for young talent. They also highlighted shortcomings in facilitating transitions from education to working life. The firm actor (F) suggested automatic work permits for international students studying in Finland as one measure that could make Finland more attractive to young professionals seeking long-term opportunities. These observations illustrate how, within the CAGE framework, what this study conceptualizes as exogenous agency interacts with structural and policy conditions to shape talent-attraction dynamics.

Underutilization of New Technologies by Firm and System-Level Actors

A representative from an educational institution (E1) reported that regional actors have not yet fully leveraged emerging technologies, such as artificial intelligence, to advance talent attraction. The representative suggested that such tools could complement human-generated knowledge and facilitate stakeholder co-creation. The discussion also indicated potential for AI-based solutions to support collaboration among educational institutions, industry, and policymakers in designing curricula that better reflect regional labor-market demands.

Participants described initiatives such as internships, cooperative education programs, talent expos, and joint research initiatives. They also discussed the potential role of governments in incentivizing such practices through tax benefits or recognition schemes for firms employing

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international talent. Mentorship platforms were described as ways to connect industry leaders with prospective talent, supporting knowledge exchange and professional development. Digital workforce-integration platforms were also discussed as a way to enable international talent to contribute remotely, potentially enhancing flexibility and global reach. The educational institution representative (E1) emphasized the importance of maintaining ongoing dialogue on talent attraction across multiple platforms, including social media, academic publications, podcasts, and physical events. Overall, participants presented technological adoption as a potential enabling resource, while its underutilization was described as a constraint on existing talent-attraction efforts.

Discussion

The regional practices, policies, and firm strategies observed in Vaasa illustrate how agency interacts with contextual conditions to address human capital challenges. These insights suggest how the region may develop the specialized workforce needed for high-tech battery production before large-scale manufacturing commences. Grillitsch and Sotarauta (2019) conceptualize agency broadly in regional change processes, whereas Trippl et al. (2020) situate it more specifically within the development of green regional industrial paths. Together, these perspectives provide a useful lens for examining workforce dynamics in emerging green industries.

The Nordic battery industry is expected to play a significant role in the European battery transition, driven by growing demand for electric vehicles and sustainable energy storage solutions (Okonkwo et al., 2024). Accordingly, Sweden, Finland, and Norway have adopted ambitious strategies to build competitive and sustainable battery value chains. However, the availability of highly skilled workers in areas such as electrochemistry, process engineering, automation, and industrial-scale manufacturing remains a key challenge (Okonkwo et al., 2024; Ministry of Economic Affairs and Employment of Finland, 2021; Regjeringen.no, 2022). From a GPD perspective, attracting and retaining such expertise is important for regional competitiveness and innovation. Okonkwo et al. (2024) further emphasize regional agency and institutional coordination in shaping the industry's trajectory, highlighting the strategic role of human capital in sustaining emerging industrial paths. Applying the CAGE framework helps clarify how Vaasa's contextual conditions shape talent-attraction efforts. At the regional level, place-based leadership plays an important role. Vaasa's socio-economic strengths, industrial history, and quality of life provide a foundation for firms and institutions to act strategically, aligning with the notion that historical legacies influence the development of entrepreneurial cultures (Coe et al., 2019; Gherhes et al., 2020). By leveraging these regional assets, actors appear able to position Vaasa as an attractive destination for international talent, thereby supporting the development of the skilled workforce associated with battery production (Okonkwo et al., 2024; Okonkwo, 2024a, 2024b).

At the firm level, innovative entrepreneurship operationalizes these regional advantages. Firms in Vaasa deploy place-branding, social media storytelling, flexible hiring practices, and diversity initiatives to attract international professionals. These activities represent endogenous

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agency through which firms respond to anticipated skill shortages in electrochemistry, process engineering, and automation (Fossil Free Sweden, 2020; Ministry of Economic Affairs and Employment of Finland, 2021). Firms also exercise agency within technological contexts by leveraging digital platforms to complement human collaboration. Artificial intelligence and digital platforms may provide opportunities to connect firms, policymakers, and prospective talent, suggesting that technological capabilities complement rather than replace human capabilities. These observations remain exploratory and should not be interpreted as evidence of demonstrated effects on talent attraction. Moreover, findings on digital platform use for recruitment come from firms outside the battery sector rather than Vaasa's emerging battery firms. Such practices should therefore be understood as potentially transferable rather than as established practices within the emerging battery industry.

Institutional entrepreneurship at the system level complements firm-level efforts by shaping structural conditions for talent attraction. Policymakers and regional authorities implement interventions such as automatic work permits for graduates, alignment of university curricula with industry needs, and incentives for firms to employ international talent. This study conceptualizes these forms of agency as exogenous and endogenous as interacting with firm-level initiatives to create conditions that may reduce structural barriers and enhance Vaasa's competitiveness as a battery hub (Regjeringen.no, 2022; Okonkwo et al., 2024). At the same time, attracting international talent remains contingent on broader demographic, labor-market, and migration dynamics beyond regional control.

Sustaining the talent also requires coordinated deployment of firm- and system-level agency within Vaasa's contextual environment. Attracting skilled professionals is only an initial step; mentorship programs, career development pathways, and community engagement initiatives are necessary to support talent integration and retention (Niemi et al., 2021). While TM literature emphasizes the strategic importance of retention and human capital development (Gallardo-Gallardo et al., 2020; Dries, 2013), the mechanisms outlined here are interpreted as derived practices rather than directly observed causal effects.

This study advances understanding at the intersection of GPD and Talent TM by applying the CAGE framework as an analytical lens (Grillitsch and Sotarauta, 2019; Trippl et al., 2020). It positions talent attraction as both a relevant human capability for GPD and a strategic resource for firms (Gallardo-Gallardo et al., 2020; Dries, 2013). Conceptually, the study reconceptualizes talent attraction as a contextually embedded form of agency rather than solely as an organizational function. This builds on TM scholarship emphasizing the importance of organizational and external contexts (Gallardo-Gallardo et al., 2020) and GPD scholarship that conceptualizes agency as purposive action through which actors seek to influence path development within structural conditions and opportunity spaces (Grillitsch and Sotarauta, 2019; Jolly et al., 2020). By bringing these perspectives together, the study makes two related contributions. First, it extends TM scholarship beyond the firm level by conceptualizing talent attraction as a process shaped by regional contexts and actors' agency in addressing workforce challenges. Second, it contributes to GPD scholarship by positioning talent attraction as a distinct mechanism through which actors mobilize human capabilities and contribute to GPD.

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While GPD research acknowledges the importance of human capital, the role of talent attraction as a mechanism linking agency, human capabilities, and GPD remains less explicitly theorized.

The CAGE framework provides a common analytical vocabulary for examining how institutional, industrial, and socioeconomic contexts enable and constrain agency at the firm, regional, and national levels. The distinction between endogenous agency at the firm and regional levels and exogenous agency at the national level, as conceptualized in this study, clarifies how purposive human action interacts with contextual structures to shape talent attraction and regional development (Okonkwo et al., 2024; Ministry of Economic Affairs and Employment of Finland, 2021). From this perspective, talent attraction is understood as a dynamic process that responds to regional conditions and forms part of the broader interaction between human capabilities, agency, and regional development trajectories (Johns, 2017; Grillitsch and Sotarauta, 2019; Trippl et al., 2020).

Empirically, the study offers an illustrative, theory-informing contribution through the case of Vaasa and the emerging Nordic battery industry. It demonstrates how the CAGE framework can be operationalized to examine interactions between agency and context during an anticipatory phase of industrial development, capturing early-stage agency, expectations, and strategic imaginaries that may shape path emergence. The findings indicate that multiple forms of agency, including place-based leadership, innovative entrepreneurship, and institutional facilitation, interact across scales and may enable or constrain talent attraction. They also reveal tensions between firm-level strategies and broader system-level conditions. For example, regional initiatives may support efforts to attract highly specialized international talent. At the same time, demographic trends, labor-market competition, and the challenge of retaining skilled workers in smaller regions constrain these efforts. The Vaasa case therefore provides a strategic empirical setting in which abstract theoretical constructs can be examined through observable practices, rather than seeking statistical generalization, thereby supporting analytical generalizability (Okonkwo et al., 2024; Okonkwo, 2024b; Regjeringen.no, 2022).

Implications for Other Regions and Emerging Green Industries

While this study is empirically grounded in the Vaasa region and the emerging Nordic battery industry, its contribution lies in analytical rather than statistical generalization. The CAGE framework offers a potentially transferable lens for examining how talent attraction operates as a contextually embedded form of agency within GPD across diverse regional and industrial settings. Rather than replicating Vaasa's specific institutional or industrial configuration, the framework highlights mechanisms and interactions that may also be observed in regions facing similar structural conditions. However, how agency is exercised and translated into outcomes will likely vary with institutional arrangements, labor-market structures, and regional development trajectories.

The findings are particularly relevant for regions characterized by strong path dependence in human capital, limited local labor supply, and the emergence of skill-intensive green industries.

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In such contexts, talent attraction becomes strategically important not only as a labor-market function but also as a means for actors to influence regional development trajectories. The CAGE framework helps explain why talent-attraction processes may vary across regions, as institutional, organizational, and socio-economic conditions simultaneously enable and constrain them.

Beyond the battery sector, similar dynamics may be observed in emerging green industries such as green hydrogen and electric aviation (Okonkwo, 2023; Shahzad et al., 2026). These sectors also involve technological transformation, emerging competence requirements, and changing regional labor-market conditions. Research on green hydrogen highlights the importance of regional labor-market dynamics and potential mismatches between emerging green jobs and existing skills (Irarrazaval et al., 2026), while research on future aviation jobs points to changing skill and competency requirements associated with technological development (Talib et al., 2025). In such settings, firm-level innovative entrepreneurship may enhance regional attractiveness through place branding and organizational narratives. In contrast, system-level institutional entrepreneurship may shape talent mobility through immigration, labor, and education policies. The CAGE framework enables analysis of how these forms of agency interact to generate context-specific talent-attraction dynamics.

For policymakers and regional development actors outside the Nordic context, the findings suggest that talent attraction cannot be addressed solely through isolated firm-level initiatives. Without alignment between regional place-based leadership and national institutional frameworks, entrepreneurial efforts may create symbolic attractiveness without necessarily generating sustained labor inflows. Conversely, supportive institutional environments may remain underutilized without coordinated regional leadership that can mobilize local assets and align actor expectations. The framework therefore underscores the importance of coordination across governance levels in shaping talent-attraction processes.

More broadly, the CAGE framework provides an analytical template for comparative research across regions and industries. By examining contextual conditions, forms of agency, and their interactions in shaping talent attraction, future studies can explore how different configurations of these factors relate to Green Path Development. Such work can help identify the conditions under which forms of agency may help address human-capital constraints, thereby advancing understanding of how human-capital dynamics influence GPD across diverse regional settings.

Conclusion

This study suggests that talent attraction is an important mechanism in Green Path Development (GPD), shaped by the interaction of context and agency. Using the CAGE framework, it shows how firm-level innovative entrepreneurship and system-level institutional entrepreneurship interact with regional socio-economic, institutional, and technological conditions to attract and retain specialized talent. Evidence from Vaasa's emerging battery industry illustrates how coordinated multi-level actions may help address skill shortages and other regional labor-market constraints and support early-stage GPD. The study contributes an

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interdisciplinary perspective linking GPD and TM, with the CAGE framework serving as an analytical tool for understanding how regions may mobilize human capabilities in emerging green industries.

The study is limited to the Vaasa region and the Nordic battery industry, which constrains the broader transferability of its findings. Future research could apply the CAGE framework across different regions and industries to examine varying context–agency configurations and their implications for talent attraction. In addition, since the analysis focuses on publicly articulated strategies and actor interactions, longitudinal and interview-based studies could provide deeper insights into how talent-attraction strategies are enacted, negotiated, and evolve as green industrial paths mature. Such research would further clarify talent attraction's role in GPD under changing institutional and market conditions.

Declarations
There are no conflicts of interest and no funding received for this publication.

Data availability statement
The data that support the findings of this study are publicly available on YouTube.

References

Adolfsson-Tallqvist, J., Ek, S., Forstén, E., Heino, M., Holm, E., Jonsson, H., ... and Roschier, S. (2019). *Batteries from Finland*. https://www.businessfinland.fi/globalassets/finnish-customers/02-build-your-network/bioeconomy--cleantech/batteries-from-finland/batteries-from-finland-report_final_62019.pdf

Battery Norway (2023) Report on the Nordic Battery Value Chain. https://batterynorway.no/report-on-the-nordic-battery-chain/

Bhalla, V., Caye, J.-M., Lovich, D., and Tollman, P. (2018). A CEO's guide to Talent Management today. Boston Consulting Group. Retrieved from https://www.bcg.com/ publications/2018/ceo-guide-talent-management-today.aspx.

Baumgartinger-Seiringer, S., Miörner, J., & Trippl, M. (2020). Towards a stage model of regional industrial path transformation. *Industry and Innovation*, *28*(2), 160-181. https://doi.org/10.1080/13662716.2020.1789452

Binz, C., Truffer, B., and Coenen, L. (2016). Path creation as a process of resource alignment and anchoring: Industry formation for on-site water recycling in Beijing. *Economic geography*, *92*(2), 172-200. doi:10.1080/00130095.2015.1103177.

Bowen, G. A. (2009). Document analysis as a qualitative research method. *Qualitative research journal*, *9*(2), 27-40. https://doi.org/10.3316/QRJ0902027

Cappelli, P., and Sherer, P. D. (1991). The missing role of context in OB: The need for a meso-level approach. Research in Organizational Behavior, 13,55–110.

City of Vaasa. (2024). *EnergyVaasa receives the President of the Republic's Internationalisation Award: Jointly earned. https://www.vaasa.fi/en/news/energyvaasa-receives-the-president-of-the-republics-internationalisation-award-jointly-earned/*

Coe, N. M., Kelly, P. F., and Yeung, H. W. (2019). *Economic geography: a contemporary introduction*. John Wiley and Sons.

Coenen, L., Hansen, T., Glasmeier, A., and Hassink, R. (2021). Regional foundations of energy transitions. *Cambridge Journal of Regions, Economy, and Society*, *14*(2), 219-233. https://doi.org/10.1093/cjres/rsab010

Cooke, F. L., Saini, D. S., and Wang, J. (2014). Talent Management in China and India: A comparison of management perceptions and human resource practices. Journal of World Business, 49(2), 225–235. https://doi.org/10.1016/j.jwb.2013.11.006

This work is licensed under a Creative Commons Attribution 4.0 International License

Daily Finland (2025). Finland to cancel work-based permit after 3 months' joblessness from June. https://www.dailyfinland.fi/national/43338/Finland-to-cancel-work-based-permit-after-3-months-joblessness-from-June

Dawley, S., Karlsen, A., and MacKinnon, D. (2025). Agency, skills and workforce adaptation: Examining the challenge of green industrial restructuring for regional labour markets. In*Sustainable Regional Restructuring* (pp. 59-74). Edward Elgar Publishing. https://doi.org/10.4337/9781035330799.00012

Dries, N. (2013). The psychology of talent management: A review and research agenda. Human Resource Management Review, 23(4), 272–285. https://doi.org/10.1016/j.hrmr.2013.05.001

Eriksen, M. S., and Frivold, M. T. (2023). Barriers to regional industrial development: An analysis of two specialized industrial regions in Norway. *Norsk Geografisk Tidsskrift-Norwegian Journal of Geography*, *77*(1), 21-34. https://doi.org/10.1080/00291951.2023.2192225

Firlus, B. H., Martin, R., and Rypestøl, J. O. (2023). Weaving sustainability: Asset modification and Green Path Development in Norway's outdoor textile industry. *Norsk Geografisk Tidsskrift-Norwegian Journal of Geography*, *77*(5), 269-280. https://doi.org/10.1080/00291951.2023.2271494

Fossil Free Sweden (2020) Strategy for fossil free competitiveness – Sustainable battery value chain. https://fossilfrittsverige.se/en/start-english/strategies/strategy-for-a-sustainable-battery-chain/

Gallardo-Gallardo, E., Thunnissen, M., and Scullion, H. (2020). Talent management: context matters. *The International Journal of Human Resource Management*, *31*(4), 457-473. https://doi.org/10.1080/09585192.2019.1642645

Gallardo-Gallardo, E., Arroyo Moliner, L., and Gallo, P. (2017). Mapping collaboration networks in Talent Management research. Journal of Organizational Effectiveness: People and Performance, 4(4), 332–358. doi:10.1108/JOEPP-03-2017-0026

Gallardo-Gallardo, E., Nijs, S., Dries, N., and Gallo, P. (2015). Towards an understanding of Talent Management as a phenomenon-driven field using bibliometric and content analysis. Human Resource Management Review, 25(3), 264–279. https://doi.org/10.1016/j.hrmr.2015.04.003

Gherhes, C., Vorley, T., and Brooks, C. (2020). Making sense of industrial decline: How legacies of the past influence the development of entrepreneurship cultures in formerly industrialized places. *Entrepreneurship and Regional Development*, *32*(9-10), 899-921. https://doi.org/10.1080/08985626.2020.1842914

Grillitsch, M., and Asheim, B. (2018). Place-based innovation policy for industrial diversification in regions. *European Planning Studies*, *26*(8), 1638-1662. https://doi.org/10.1080/09654313.2018.1484892

Grillitsch, M., and Sotarauta, M. (2019). Trinity of change agency, regional development paths and opportunity spaces. *Progress in human geography*, *44*(4), 704-723. https://doi.org/10.1177/0309132519853870

Intergovernmental Panel on Climate Change. (2023). *Climate Change 2023: Synthesis Report. Contribution of Working Groups I, II and III to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change.* Cambridge University Press. https://report.ipcc.ch/ar6syr/

Irarrazaval, F., Albornoz, C., and Bogolasky, F. (2026). The troubled geography of green jobs: Examining the estimations and expectations of green hydrogen development in regional labor markets in Chile. *Applied Geography*, *186*, 103828. https://doi.org/10.1016/j.apgeog.2025.103828

Isaksen, A., Langemyr Eriksen, E., and Rypestøl, J. O. (2020). Regional industrial restructuring: Asset modification and alignment for digitalization. *Growth and Change*, *51*(4), 1454-1470. https://doi.org/10.1111/grow.12444

Isaksen, A., Trippl, M., Kyllingstad, N., and RypestÃ, J. O. (2019). *Digital transformation of regional industries: The link between new path development, innovation system dynamics, and asset modification* (No. geo-disc-2019_02). Institute for Economic Geography and GIScience, Department of Socioeconomics, Vienna University of Economics and Business.

Johns, G. (2017). Reflections on the 2016 Decade Award: Incorporating context in organizational research. Academy of Management Review, 42(4), 577–595. doi:10.5465/ amr.2017.0044

Jolly, S., Grillitsch, M. and Hansen, T., (2020). Agency and actors in regional industrial path development. A framework and longitudinal analysis. *Geoforum*, *111*, pp.176-188. https://doi.org/10.1016/j.geoforum.2020.02.013

Khilji, S. E., and Schuler, R. S. (2017). Talent Management in the global context. *The Oxford handbook of talent management*, 399-420. Oxford: Oxford University Press.

Khilji, S. E., Tarique, I., and Schuler, R. S. (2015). Incorporating the macro view in global talent management. Human Resource Management Review, 25(3), 236–248. doi:10. 1016/j.hrmr.2015.04.001

This work is licensed under a Creative Commons Attribution 4.0 International License

Knoblauch, H., and Schnettler, B. (2012). Videography: Analysing video data as a 'focused' ethnographic and hermeneutical exercise. *Qualitative Research*, *12*(3), 334-356.

Kyllingstad, N., Rypestøl, J. O., Schulze-Krogh, A. C., and Tønnessen, M. (2021). Asset modification for regional industrial restructuring: digitalization of the culture and experience industry and the healthcare sector. *Regional studies*, *55*(10-11), 1764-1774. https://doi.org/10.1080/00343404.2021.1878126

Leca, B., and Naccache, P. (2006). A critical realist approach to institutional entrepreneurship. Organization,13(5), 627651.https://doi.org/10.1177/1350508406067007

Löfmarck, A., Lepola, A., Martinsen, K. G., Utriainen, M., Ilomäki, R. and Rintamäki, S. (2022) *Nordic Battery Belt logistics, local and regional supply chains and logistics solutions.* https://www.kvarken.org/projekt/nordic-battery-belt-logistics-localregional-supply-chains-and-logistics-solutions/

MacKinnon, D., Dawley, S., Steen, M., Menzel, M. P., Karlsen, A., Sommer, P., ... and Normann, H. E. (2019). Path creation, global production networks and regional development: A comparative international analysis of the offshore wind sector. *Progress in Planning*, *130*, 1-32. https://doi.org/10.1016/j.progress.2018.01.001

Magbool, M. A. H. B., Amran, A., Nejati, M., and Jayaraman, K. (2016). Corporate sustainable business practices and talent attraction. *Sustainability Accounting, Management and Policy Journal*, *7*(4), 539-559. https://doi.org/10.1108/SAMPJ-06-2015-0042

Ministry of Economic Affairs and Employment of Finland (2021) National Battery Strategy 2025 - Executive Summary. https://julkaisut.valtioneuvosto.fi/handle/10024/162685

Naeem, M., Ozuem, W., Howell, K. and Ranfagni, S. (2023). A step-by-step process of thematic analysis to develop a conceptual model in qualitative research. *International Journal of Qualitative Methods* 22, 16094069231205789. https://doi.org/10.1177/16094069231205789

Näsman, M., Hane-Weijman, E., and Eriksson, R. H. (2026). The Fragility of Strategic Coupling: Northvolt and the Limits of Regional Agency in the Nascent European Battery Sector. *Progress in Economic Geography*, 100066. https://doi.org/10.1016/j.peg.2026.100066

Niemi, M. K., Dan, S., Kalliokoski, J., Shahzad, K., Shakeel, S. R., Alagirisamy, R., & Laurila, I. (2021). Talent Retention and the Development of Digital Skills: A study of the ecosystem-based Digitalisation Academy located in Vaasa, Finland. https://urn.fi/URN:ISBN:978-952-327-840-0

Okonkwo, E. (2024a). The branding pyramidical tool kit for enhancing actors' agency in regional energy transitions within the Nordic Battery Belt. *Humanities and Social Sciences Communications*, *11*(1), 1-11. https://doi.org/10.1057/s41599-024-03737-4

Okonkwo, E. (2024b). What type of emerging green path is the Nordic battery industry on: importation or new creation? *European Planning Studies*, *33*(2), 264-280. https://doi.org/10.1080/09654313.2024.2437261

Okonkwo, E., Berg, P., and Rabetino, R. (2024). Green Path Development : The agency of the City of Vaasa in establishing the battery industry. *Environmental Policy and Governance*, *35*(1), 132-144. https://doi.org/10.1002/eet.2133

Okonkwo, E. (2023). Technological Transition to Electric Aviation in the Kvarken Region: A Review of the FAIR Reports (Finding Innovations to Accelerate the Implementation of Electric Regional Aviation). *Journal of Geography, Politics and Society*, *13*(1), 42-54. https://doi.org/10.26881/jpgs.2023.1.05

Paauwe, J., and Boselie, P. (2003). Challenging strategic HRM and the relevance of the institutional setting. Human Resource Management Journal, 13(3), 56–70. https://doi.org/10.1111/j.1748-8583.2003.tb00098.x

Regjeringen.no (2022) Norway's battery strategy. https://www.regjeringen.no/en/dokumenter/norways-battery-strategy/id2921424/

Roessler, M. 2025. Unlocking green transitions: system-level agency in peripheral regions. *Cambridge Journal of Regions, Economy and Society*, rsaf044. https://doi.org/10.1093/cjres/rsaf044

Rypestøl, J. O., Isaksen, A., Eriksen, E. L., Iakovleva, T., Sjøtun, S. G., and Njøs, R. (2021). Cluster development and regional industrial restructuring: agency and asset modification. *European Planning Studies*, *29*(12), 2320-2339. https://doi.org/10.1080/09654313.2021.1937951

Rypestøl, J. O., Kyllingstad, N., and Martin, R. (2023). Asset modification for regional industrial restructuring in times of economic crisis. *European Planning Studies*, *31*(8), 1715-1733. https://doi.org/10.1080/09654313.2022.2105643

This work is licensed under a Creative Commons Attribution 4.0 International License

Shahzad, S., Alrumayh, O., Almutairi, A., and Altamimi, A. (2026). Green hydrogen: A review of technological innovations, economic viability, and global prospects. *Renewable and Sustainable Energy Reviews, 225*, 116162. https://doi.org/10.1016/j.rser.2025.116162

Sotarauta M and Beer A (2017) Governance, agency and place leadership: Lessons from a cross-national analysis. Regional Studies 51: 210–223. https://doi.org/10.1080/00343404.2015.1119265

Sotarauta, M., Suvinen, N., Jolly, S., and Hansen, T. (2021). The many roles of change agency in the game of Green Path Development in the North. *European Urban and Regional Studies, 28*(2), 92-110. https://doi.org/10.1177/0969776420944995

Sparrow, P. (2019). A historical analysis of critiques in the Talent Management debate. Business Research Quarterly (BRQ). 22(3), 160–170 https://doi.org/10.1016/j.brq.2019.05.001

Steen, M., and Karlsen, A. (2014). Path creation in a single-industry town: The case of Verdal and Windcluster Mid-Norway. *Norsk Geografisk Tidsskrift-Norwegian Journal of Geography*, *68*(2), 133-143. https://doi.org/10.1080/00291951.2014.894564

Talib, M. A., Nasir, Q., Dakalbab, F., and Saud, H. (2025). Future aviation jobs: The role of technology in shaping skills and competencies. *Journal of Open Innovation: Technology, Market, and Complexity*, *11*(2), 100517. https://doi.org/10.1016/j.joitmc.2025.100517

The Guardian. (2025). *EV battery startup Northvolt files for bankruptcy in Sweden.* https://www.theguardian.com/business/2025/mar/12/ev-battery-startup-northvolt-files-for-bankruptcy-in-sweden The Guardian

Thunnissen, M. (2016). Talent management: For what, how and how well? An empirical exploration of Talent Management in practice. Employee Relations, 38(1), 57–72. doi: 10.1108/ER-08-2015-0159

Trippl, M., Baumgartinger-Seiringer, S., Frangenheim, A., Isaksen, A., and Rypestøl, J. O. (2020). Unravelling green regional industrial path development: Regional preconditions, asset modification and agency. *Geoforum*, *111*, 189-197. https://doi.org/10.1016/j.geoforum.2020.02.016

Trippl M, Grillitsch M, and Isaksen A (2017). Exogenous sources of regional industrial change: Attraction and absorption of non-local knowledge for new path development. Progress in Human Geography, 42, 687–705. Progress in Human Geography. https://doi.org/10.1177/0309132517700982

Vaasa.fi (2025). Companies. https://www.vaasa.fi/en/energyvaasa-companies/

Vaasa.fi (2024). Vaasa's population exceeds 70,000 residents – immigration and employment are driving the growth. https://www.vaasa.fi/en/news/vaasas-population-exceeds-70000-residents-immigration-and-employment-are-driving-the-growth/

Vaiman, V., Collings, D. G., and Scullion, H. (2017). Contextualising Talent Management (Editorial). Journal of Organizational Effectiveness: People and Performance, 4(4), 294–297. https://doi.org/10.1108/JOEPP-12-2017-070

Vaiman, V., Sparrow, P. R., Schuler, R. S., Collings, D. (Eds.). (2018). Macro talent management: A global perspective on managing talent in developed markets. London: Routledge.

Vardi, S., and Collings, D. G. (2023). *What's in a name? talent: A review and research agenda*. *Human Resource Management Journal*, 1–XXX. https://doi.org/10.1111/1748-8583.12500

Viegand, J. (2022). Batteries in the Nordics: Changing for Circularity. Nordic Council of Ministers. http://norden.diva-portal.org/smash/get/diva2:1660257/FULLTEXT01.pdf

Wasa Future Festival. (2023) International talents and SME's: An evening of solutions in the spirit of co-creation [Video]. YouTube. https://www.youtube.com/watch?v=hN6wfc8-irI

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