Received: 9 February 2021 | Revised: 14 October 2021 | Accepted: 15 October 2021

DOI: 10.1111/grow.12583

ORIGINAL ARTICLE

growth and change WILEY

Advancing the treatment of human agency in the analysis of regional economic development: Illustrated with three Norwegian cases

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Funding information
Länsförsäkringar Alliance Research Foundation: Regional Growth Against All Odds, Grant/Award Number: 2017/01/011; VINNOVA: An experimentally organised economy, Grant/Award Number: 2018-04797

Abstract

Human agency has become a core topic in economic geography complementing traditional, structural approaches to explain regional development. This paper contributes firstly with a discussion of the theoretical and conceptual relationships between the agency of individuals, organizations, and systems. Secondly, it proposes a novel analytical framework for studying how human agency, combined with external changes affects regional economic development, and how regional structural preconditions and external changes explain the activation of change agency. Thirdly, the relevance of the framework is examined through comparative studies of about 20 years of industrial development in three Norwegian regions. This illuminates the importance of human agency in regional transformation processes, how regional preconditions influence but not determine the activation of change agency, as well as why and how regional policy plays a role in the emergence of change agency. Yet, future research needs to investigate the context conditions, which promote or hinder the activation of change agency, to trace change in economic activities

over time and link it to causal mechanisms, and to pay attention to the unintended consequences of change agency in the longer-term.

KEYWORDS
human agency, regional development, structural transformation

1 | INTRODUCTION

In times calling for structural transformation due to financial, economic, environmental, or health crises, scholars have increasingly turned to the role of agency. This includes studies on the role of actors to promote novelty and diversification (Elekes et al., 2019; Neffke et al., 2018), to develop new regional development paths (Isaksen et al., 2019; Jolly et al., 2020), to strategically position regions in global production networks (Dawley et al., 2015; MacKinnon et al., 2019; Yeung, 2021), and to understand the transition to a green economy (Sotarauta et al., 2021; Trippl et al., 2020). Overall, this paper contributes to the literature on regional economic development by advancing the theoretical and analytical treatment of human agency in processes of structural change.

In-depth investigations focusing on why industries in regions change suggest that decisions, strategies, and interventions of a set of influential actors are important as a response to or cause of key events. Key events are crucial occurrences in the process of change (Makkonen et al., 2012). While it often remains difficult to link specific actions to observed changes in regional development, in combination and over time, these actions appear to be a central driving force for change (Dawley, 2014; Isaksen et al., 2019; MacKinnon et al., 2019; Steen, 2016). "Human agency refers to intentional, purposive, and meaningful actions, and the intended and unintended consequences of such actions" and change agency refers to human actions that aim at making a change (Grillitsch & Sotarauta, 2020, p. 707). Change agency is, on the one hand, connected to the past and the preconditions available to specific actors in specific places and times. On the other hand, change agency is motivated by the imaginations of different futures for the realization of which actors combine knowledge, networks, and other resources in new and sometimes unexpected ways (Emirbayer & Mische, 1998; Garud et al., 2010). To be sure, studies on human agency are different from the typical micro-perspective in economics (and related regional applications), which assumes that actors in a specific context behave in a similar way. Studies on human agency are not about the aggregation of a set of similar actions but about the emergent consequences of a variety of actions that may reinforce or contradict each other (Karnøe & Garud, 2012). Studies on human agency recognize that within a context there can be substantial differences in how individual actors behave, even though patterns of agency may emerge (Grillitsch & Sotarauta, 2020).

The emerging literature on agency in regional economic development follows the call for complementing existing structural explanations of regional development with a better understanding of how change processes function from the bottom-up, this is to say how diverse actors work for or against regional structural change, and how this shapes regional economies over time (Asheim et al., 2016; Boschma, 2017; Bristow & Healy, 2014; Hassink et al., 2019; Köhler et al., 2019; MacKinnon et al., 2019). This recent work on human agency has looked at the role of specific types of actors (firm and non-firm), or a combination of actors for regional economic development. These studies have shed light on specific aspects of agency but do typically not

address the relationship between the agency of individuals, organizations, and larger systems. On the one hand, organizations and systems constitute the structures within which individuals act, and, on the other hand, organizations and systems exercise agency that cannot be reduced to the sum of the actions of individuals. The *first contribution*, this paper aims to make, is thus to move a step forward in addressing this theoretical problem. To do this, a stratified ontology of agency is proposed, which explicates the links between agency exercised by individuals, organizations, and systems. This ontology provides a framework to theorize, analyze, and empirically investigate how structures influence individual actions (downward causation) and how individual actions change organizations and systems (upward causation).

Furthermore, a major difficulty when empirically studying structure and agency is to disentangle how one affects the other, as both are intrinsically related. Giddens (2007:1984) recognizes this difficulty and suggests as a methodology to study the "duality of structure" to bracket either structure or agency, which simplistically suggests to treat structure as given when focussing on agency, and vice versa. Jessop (2001) takes issue with this bracketing and suggests a strategic-relational approach where actors strategically take structures and their ability to change structures into account when making decisions, and where structures exercise a selective influence on which actions are taken. We, however, take most inspiration from Archer's (1982, 1995) morphological approach, advocating a dualism of structure and agency, where each concept needs to be kept analytically separate in order to investigate the interplay between structure and agency over time. Following this approach, the *second contribution* is to put forward an analytical framework geared to the analysis of studying the interplay between structure and agency over time in the context of regional economic development. For this purpose, we suggest combining two recent conceptualizations of human agency that have gained significant traction. The first one is the Trinity of Change Agency (TCA), which identifies three fundamental types of change agency—innovative entrepreneurship, institutional entrepreneurship, and place-based leadership (Grillitsch & Sotarauta, 2020). The second conceptualization distinguishes between firm-level and system-level agency, which suggests that regional change does not only require agency of firms but also agency of actors in the regional support system for innovation and entrepreneurship (Isaksen et al., 2019).

The *third contribution* is to illustrate the analytical framework empirically based on three in-depth case studies of about 20 years of development in three different regional contexts in Norway, where we answer the following two research questions:

- R1: In what way and to what extent do specific change agency-actor constellations and external changes explain regional economic development, and observed changes in regional innovation systems?
- R2: In what way and to what extent do regional structural preconditions and external changes explain the activation of change agency-actor constellations?

The comparative case studies were systematically selected based on a combination of two main criteria. First, all three cases are extreme cases as they exhibit periods of high or low employment growth as compared to other regions in Norway with similar structural characteristics. This is based on a quantitative analysis. Second, the three cases show a variety of regional and historical contexts. Following the case selection, we conducted in-depth case studies, which included a comprehensive document analysis as well as fieldwork with 52 interviews in total. The variety of data-sources used allowed us to triangulate and thereby underpin the validity of our findings.

2 | THEORETICAL FRAMEWORK

2.1 | A stratified ontology of human agency

Recent work on human agency has often focused on particular types of organizations and how they potentially affect regional structural change. Several studies have analyzed the role of different types of firms for economic diversification (e.g. Elekes et al., 2019; Neffke et al., 2018), while others have taken a broader perspective investigating the role of firm- and non-firm actors for the development of new industrial paths in regions (e.g. Isaksen et al., 2019; Trippl et al., 2020). Some work has unfolded the variegated forms of agency and the roles different types of actors take over time (Bækkelund, 2021; Jolly et al., 2020; Sotarauta et al., 2021). These contributions have shed light on many aspects of agency but have not explicitly discussed the relationship between individuals, organizations, and systems. This is relevant because, on the one hand, organizations and systems are structures, which enable or constrain the actions of individuals. On the other hand, systems and organizations exercise agency, which goes beyond the aggregated actions of individuals because meso-level conditions such as routines and institutions combined with individual level actions produce organizational or system-level outcomes. This is to say that similar actions of individuals may have different outcomes depending on the context in which the actions are conducted (Rutten, 2021). Thus, it is necessary to reflect about the relationship between the agency of individuals, organizations, and systems, and solve two theoretical challenges.

First, studies of human agency need to be attentive to the interplay over time between top-down causation (structure influences agency) and bottom-up causation (agency influences structure) and thereby avoiding an over- and/or under-socialized perspective on socio-economic phenomena (Granovetter, 1985). Indeed, the emphasis needs to lie on the interplay between structure and agency (Archer, 2003; Giddens, 2007:1984; Jessop, 2001). Second, studies on human agency need to explain unintended and unwanted consequences of human actions. Understanding and explaining outcomes resulting from intentional actions, and even unintended but wanted consequences is rather simple and straightforward. However, explaining the unintended and unwanted consequences are often referred to as the real challenge of the social sciences, as these outcomes neither can be explained by references to the intentions of the actors, nor to other actor-based principles such as rationalized behavior.

To do this we need a methodological approach that builds on the idea that the social world is stratified by nature. Critical realism is such an approach distinguishing between the *real*, i.e., structures and mechanism which are not directly observable, the *actual*, i.e., events which are observable phenomena, and the *empirical*, i.e., experience of events, and underlining that no level can be reduced to the next (Sayer, 1992). The level of the real represents structures that (because they are not directly observable) are invisible to common-sense thinking (Sayer, 1992, 94), causing an "underestimation of the *interdependency* of positions" (Sayer, 1992, 94). Elster calls this the "fallacy of composition" (Elster, 1978, p. 97). According to Sayer this is based on 'the assumption that, [...], what is possible for an individual must be possible for all individuals simultaneously' (Sayer, 1992, 94), leading to unintended and unwanted consequences of actions. Social structures both enable and constrain social actions of actors. In such a view social structures precede human agency, as society is seen as objectively existing, pre-given at any moment of time, but social structures are also reproduced and transformed by intentional actors. In this way, the relationship between agency and structure is mutually constituted (Archer, 1995; Bhaskar, 1997; Giddens, 2007:1984).

The stratified ontology of human agency in the tradition of critical realism helps us overcome the aforementioned theoretical challenges (Archer et al., 1998; Bhaskar, 1997; Sayer, 2000). In such a stratified ontology, individuals, organizations, and systems exercise human agency. Yet, in our conceptualization, change agency is a privilege of individuals or sets of individuals intending to change organizations or systems, and, in a realist terminology, represents a causal power (the real) (see Figure 1). In essence, this suggests that organizations and social systems created by humankind have agency, but this agency cannot be reduced to the sum of individual actions (the actual). This is because institutional logics inherent to systems and organizational routines influence the ways in which individuals exercise their power as well as the effects such exercising of powers may have.

Yet, if we examine *change agency*, where single or a set of individuals try to change organizations and systems, the routines and institutions of organizations and systems typically constitute the structures in which agents are embedded. A stratified ontology allows for a shift of the analytical focus between objects representing different levels of reality and thereby to shift between analyzing change agency, or the agency of organizations or systems. Such a stratified view of human agency is a deep theorization as opposed to a flat one where agency is subscribed to only one type of object (either individuals, organizations, or systems) without an understanding how these are interrelated.

We conceptualize change agency thus as a causal power, which does not need to be representative or common (cf. Sayer, 2000). Only through action is it possible for individuals and sets of individuals to shape organizations and systems (Archer, 1982). In other words, change agency is a causal power inherent to human beings, which is activated in some situations but not all the time. In the context of regional development, three types of change agency with distinct theoretical roots have been identified in the TCA (Grillitsch & Sotarauta, 2020). Even though these types of change agency do not necessarily encompass all the ways individuals influence and shape regional development, they are supported by a large body of theoretical and empirical work and thus constitute a good foundation for studying agency in the context of regional development.

Innovative entrepreneurship refers to actions that aim at breaking with existing ways of doing things and establishing new ones by combining knowledge and resources in novel ways (Schumpeter, 1911; Weik, 2011). Humankind has engaged in innovative entrepreneurship from ancient times: the introduction of the wheel, steam engines, semiconductors, and lean production (when originally introduced by Toyota [Womack et al., 2007]) being prominent examples

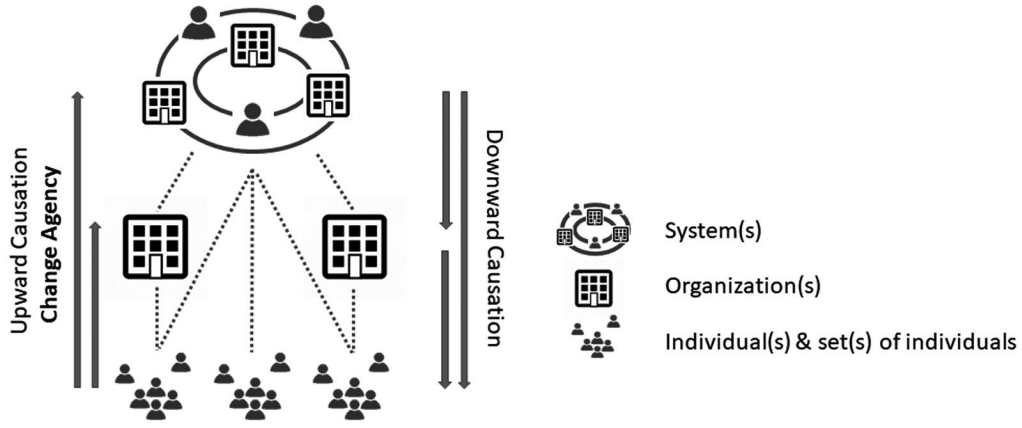

FIGURE 1 Change agency embedded in a stratified ontology of human agency

of radical forms of innovative entrepreneurship. Innovative entrepreneurship is also the driver for sustained competitiveness of hidden champions—firms that are not visible in the public but have defended leadership in global market niches over decades due to continuous innovation (Bessant, 2019; Simon, 2009). Innovative entrepreneurship is a driver of change in the economy and in regions (Ács & Varga, 2005; Feldman et al., 2005; Shane & Venkataraman, 2000).

Institutional entrepreneurship is concerned with actions and strategies aimed at changing existing institutions or introducing new ones (Battilana et al., 2009; DiMaggio, 1988) and thereby creating new opportunities such as supporting the development of new industries (Sotarauta & Pulkkinen, 2011). Institutions refer to systems of rules that enable and constrain actions and interactions (Hodgson, 2006), and can be of formal (e.g. laws, regulations) or informal (e.g. values, norms) nature. Humankind has transformed institutions over time from ancient civilizations to the global world we are currently living in. Institutions are powerful structures enabling and constraining innovation and change in regions (McCann & Ortega-Argilés, 2014; Rodríguez-Pose & Di Cataldo, 2015).

Place-based leadership is a form of leadership aimed at coordinating regional development efforts with a wide range of actors (Collinge et al., 2011; Sotarauta et al., 2017). Place-based leadership focuses on establishing common interests, mobilizing and pooling resources for collective use, and negotiating with different actors at municipal-, regional-, national-, and transnational scales to support the regional development agenda. Humankind is standing out in terms of its ability for coordinated action (Fehr & Schmidt, 1999; Turchin, 2016). The innovativeness and growth of firms depend at least partly on regional collective resources such as education and training, research facilities and laboratories, or transport and broadband infrastructure (see literature on regional innovation systems, e.g. Asheim et al., 2019; Cooke & Morgan, 1994; Doloreux & Parto, 2005).

The deep theorizing based on a stratified ontology of human agency unveils the interplay between change agency exercised by single or a set of individuals, and the agency of social structures in the form of e.g., organizations and systems of organizations. An example from Porto Alegre in Brazil can illustrate this where the three largest universities, one public and two private, Catholic, formed an alliance to orchestrate an innovation ecosystem supporting entrepreneurship and innovation in the region. In doing this the vice-chancellors of the three universities acted as institutional entrepreneurs by partly going beyond the traditional roles of universities and partly doing it together with other traditionally competing universities. By not only initiating but also taking on the leadership in the alliance, the vice-chancellors demonstrated collective place-based leadership, manifesting the trinity (at least two of the three) of change agency (Thomas et al., 2021).

However, the vice-chancellors of the three universities in the alliance were allowed and accepted to take on a place-based leadership role because of the respect and legitimation the universities as societal institutions had earned through their practice of high-quality education and research, and, moreover, being seen as non-corrupt institutions in a context that otherwise is very corrupt, which is the case both for the public sector and business. We see this as an example of agency that lies with the universities and cannot be reduced or conflated with actions of individuals. Yet, the specific change agency within the universities in the form of institutional entrepreneurship and place leadership exercised by the vice-chancellors made the alliance work (Thomas et al., 2021).

Thus, we would argue that socially constructed organizations and systems collectively represent agency beyond the sum of individual (change) agency found within them. However, in order to change institutions, routines, or practices, change agency exercised by single or sets of

individuals is needed. This adds to classic theoretical approaches on the structure-agency relation by emphasizing the potential of change agency to transform organizations and systems, and thereby their agency too.

2.2 | Change agency in regional innovation systems

The emergence and effects of change agency depend on the relations of actors in time and space (Archer et al., 1998; Bhaskar, 1997; Sayer, 2000). Such context dependence implies that similar actions are expected to have different effects contingent on other, confounding conditions present simultaneously. Studies on change agency, therefore, call for a holistic and comprehensive approach. The Regional Innovation Systems (RIS) approach, with its origin in neo-Schumpeterian and institutional theoretical positions, provides a framework for capturing change agency in such a holistic and comprehensive manner (Asheim et al., 2019). Historically, RIS represent an essential part of the context that influences change agency. However, firms are also often part of global production and innovation networks, and changes in firms and RIS are influenced by national and global political framework conditions, global industrial standards, markets, and technological changes. Hence, RIS constitute open systems (Asheim et al., 2016).

Studies on RIS typically differentiate between a knowledge exploitation (or industry) subsystem comprising private firms, clusters, and value chains, and a knowledge exploration and diffusion subsystem referring to the support structures for innovation including higher education and R&D institutes and technology transfer centers (Asheim et al., 2019). The main idea is that change agency can relate to both subsystems in the RIS. Change Agency is exercised by single, or a set of individuals anchored in the knowledge exploitation system (defined as firm-level actors) or in the knowledge exploration subsystem (defined as system-level actors) (see Figure 2).

Firm-level actors performing change agency include innovative entrepreneurs that start new firms and intrapreneurs that contribute with innovations in existing firms, or actors from the business community who engage in shaping institutions or regional conditions (i.e. institutional entrepreneurs or place-based leaders). Innovation activities usually involve many firm employees, and sometimes also hired specialists, organized in specific projects or through daily work routines. We also know that innovation activities frequently include collaboration with external actors, such as customers, suppliers, and research institutes (Lundvall, 2007). Yet, firm-level change actors are typically individuals at a strategic level in firms that organize and are responsible for firms' innovation activities such as the CEOs, R&D-managers, and entrepreneurs

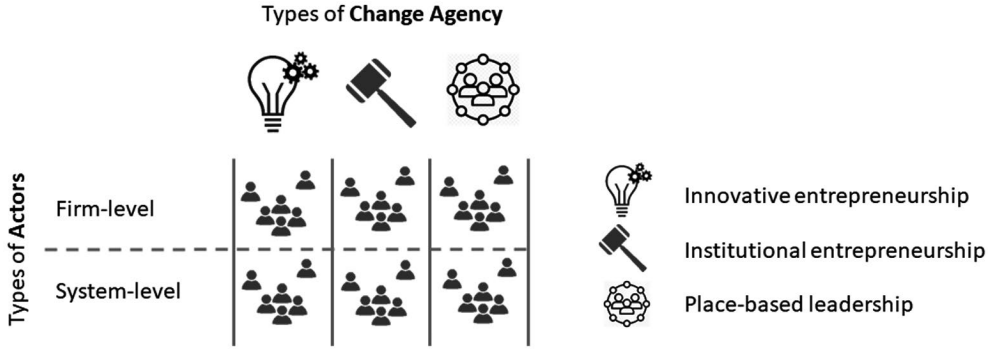

FIGURE 2 Change agency-actor constellations in regional innovation systems

in small firms. These actors (innovative entrepreneurs) initiate and carry out innovation projects. However, as mentioned above, firm-level actors may also perform institutional entrepreneurship and place-based leadership. Examples are firm leaders that initiate cluster-building activities or lobby for policy support to a particular industry or to a joint organization for several firms.

Change agency on the system-level is carried out by actors in knowledge and support organizations in RIS, including policy makers and politicians, with power and decision-making authority to alter organizations, as well as informal leaders. Their agency often targets changes in institutions or the regional support structures (i.e. institutional entrepreneurship). This consists of creating new, adapting existing or making new use of existing organizations, institutions, and policies to respond better to current or future challenges for regional firms and industries (Miörner & Trippl, 2017). System-level actors can also perform innovative entrepreneurship. An example is how key politicians and leaders of research institutes from the mid-1950s acted to support and promote state-owned companies to develop a high-tech Norwegian industry as part of a national industrial policy (Wicken, 2002). System-level agency may further consider fixing systemic failures (Woolthuis et al., 2005) or transformation failures (Weber & Truffer, 2017) in RIS (i.e. institutional entrepreneurship).

Bringing together the three types of change agency and the two types of actors results in six change agency-actor combinations in RIS, which are interlinked and influence each other (Figure 2). Change agency can originate from firm- and/or system-level actors (Isaksen et al., 2019). For instance, it can start when one or a few firms innovate and where the pioneer firms' innovations are copied and further developed by more local firms. Pioneer firms may also engage in place-based leadership to develop a cluster (Feldman et al., 2005) or may put pressure on system-level actors to take on such roles. Change agency can also start with system-level actors by for instance changing institutions (institutional entrepreneurship), e.g., introducing new policy support tools, or mobilizing collective resources (place-based leadership), e.g., to establish a cluster organization, in order to provide for existing or alleged future needs in local firms and industries, or to facilitate the emergence of new types of firms and industries in a region. Such changes may then trigger and demand innovative entrepreneurship at the level of firms in order to realize new growth paths.

Combining the two agency conceptualizations also implies an advancement of the RIS approach, which—in spite of its neo-Schumpeterian theoretical origin with its view on dynamic processes causing qualitative transformations of economies—has been criticized for being overly static in the way it has been applied. Asheim et al. (2016) argue that the key to a dynamic understanding of RIS and the way such systems transform and change is a stronger focus on the micro-foundations represented by involved actors and agencies. By highlighting types of actors in the two subsystems of a RIS and linking these actor types with the types of change agency they can engage in, we strengthen the (neo-) institutional theoretical background of the RIS approach by highlighting the potential role of actors and agencies in changing and shaping organizations and institutions.

2.3 | Analytical framework

Following a critical realist-informed approach, we see change agency-actor combinations as a necessary condition for realizing change in regional economies that goes beyond the mere consequence of decisions or forces unfolding outside the region and being outside the

control of regional actors. Change agency represents a *causal power*, which goes beyond the *actual* and observable actions of individuals. Agency is embedded in RIS structures and multi-scalar institutions and networks but will also often react upon external changes beyond the control of actors. Figure 3 illustrates this argument and its relation to the research questions (see Section 1), summarizing our analytical framework. For instance, a drop in commodity prices typically is such an exogenous factor not under the control of regional actors. A mere consequence might be the need to cut production or the bankruptcy of firms. However, any action to adapt to these changes or find new markets requires change agency. Furthermore, we have argued that change agency is a real power of humankind, the activation of which depends, however, on context conditions which comprise both regional structural preconditions and the embedding of regions in multi-scalar networks and institutional architectures. To be sure, even though we focus on change agency-actor combinations in regional contexts, actors may mobilize knowledge and resources regionally and extra-regionally. The analytical framework in Figure 3 also illustrates the investigation of structure and agency over time. The starting point is a historically developed RIS, inserted in multi-scalar institutions and networks. The RIS structures and external changes promote or hinder the emergence of different change agency/actor constellations. Over time and in combination with extra regional factors, these change agency/actor constellations shape regional economic development, which manifests in observed and experienced changes to RIS. This relates to the observed growth of some and decline of other industries in a region, potential changes to RIS structures, and the embedding of RIS in multi-scalar institutions and networks.

3 | METHODOLOGY AND DATA

The empirical illustration builds on a comparative case study design covering three labor market regions in Norway. This design is chosen as the aim is to contribute to the understanding of how regional differences in structural preconditions influence change agency-actor constellations, and to investigate how different change agency-actor constellations influence regional economic development. The case selection follows the principles of extreme cases and variation between cases with the purpose to gain theoretical insights (Eisenhardt & Graebner, 2007). Overall, the research strategy was to identify regions that deviated in certain periods exceptionally from the development of other regions considering a battery of structural preconditions and then use in-depth case studies to explain this exceptional development. The selection of regions proceeded in two steps. First, we identified regions whose growth paths could not be explained by structural preconditions. Technically, regional

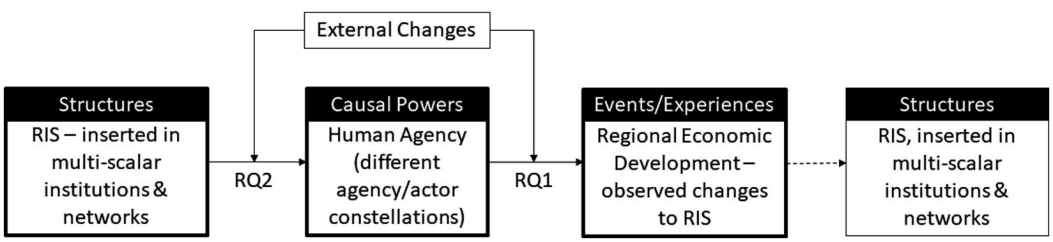

FIGURE 3 The analytical framework

growth regressions were used with data about Norwegian labor market regions available from 2000 to 2016. The dependent variable was employment growth[1] and as explanatory variables, we used measures for related variety, specialization, diversity, competition, oil-dependency of the region, manufacturing share, high-tech manufacturing share, knowledge-intensive services share, public employment share, median wage, human capital, population density, and regional employment. The residuals in the regional growth regression identify the part of employment growth, which structural preconditions did not explain. In each year, we standardized the residuals from the growth regression so that the distribution of residuals had a mean of 0 and a standard deviation of 1. We then considered only those regions that exhibited periods (minimum three consecutive years) in which the residual was consistently larger or smaller than one standard deviation, plus or minus respectively (for details, see Grillitsch, Martynovich, et al., 2021). In a second step, we prepared regional profiles of the extreme cases using secondary data. This included information about regional characteristics such as location, population, industrial structure, higher education and research infrastructure, as well as about the relevance of a number of external changes such as commodity prices, policies, investment decisions, industry dynamics, and technological change. Based on the regional profiles about the extreme cases, we selected three labor market regions with varying regional preconditions:

- Arendal: A medium-sized and diversified region, and administrative center in former East-Agder County,
- Ulsteinvik: A semi-peripheral, entrepreneurial region with a tradition in the maritime industry on the Western coast, and
- Mo i Rana: A rather peripheral region in Northern Norway dominated by processing industries and a history of one dominant, publicly owned firm.

Annex 1 provides figures about population and employment growth, and the residuals of the regional growth regressions, pinpointing periods of unexpected high or low growth. These three regions are embedded in a well-developed welfare state with a highly educated population and competent government and public administration, which Norway shares with many West-European countries, as well as a dedicated regional development policy supporting for instance regional cluster initiatives. Hence, Norway provides for a favorable context for change agency.

The data collection closely followed the theoretical and analytical framework presented in Section 2 (for details, see Grillitsch, Rekers, et al., 2021). Building on the collection and analysis of quantitative data and documents, which led to the selection of cases, we conducted firstly a more comprehensive document analysis, including reports, regional planning documents, regional strategies, newspaper articles, and websites. Relating to the analytical framework, this work provided us with a good understanding of the historical context of the region, RIS structures, the dominant industries, and their positions in global value chains. Furthermore, it provided some indications about how the regional economies have developed over the observation period, and which external changes have affected regional development. We analyzed the data with the aim to construct a timeline of events that related to or explained the periods of unexpected high or low growth in the period after 2000. Events included external changes (e.g., fluctuations in commodity prices, investment, and relocation decisions of external actors) and happenings of regional importance (e.g., major innovations, policy initiatives, or awards, the setting up or reorganization of support organizations or

higher education and research infrastructure, etc.). The document analysis allowed us to identify important events (part of the *actual* in critical realist terms) but interviews were required to develop an understanding of change-agency actor constellations as potential *causal powers* of change.

As regards the selection of the interviewees, we used the document analysis to identify individuals who were related to the key events. For instance, this could be persons that were named in newspaper articles in relation to key events, or persons who had leading positions in the organizations that were influential in these events. In addition, we identified key informants in the main industries of the region, local governance, support structures, and higher education institutions. We validated and extended the list of informants in a first step with a key informant in each region, and second in the interviews. Hence, we extended the list of interviewees both based on recommendation (snowballing) as well as when new aspects emerged that required further investigation. In total, we conducted 14 interviews in Arendal, 20 interviews in Ulsteinvik, and 18 interviews in Mo i Rana (Annex 2 includes details).

The interviews focused on the change agency-actor constellations (the *causal powers* of interest), their structural antecedents, as well as intended and unintended consequences. The interview process was supported with a common interview guide for all cases covering important changes or events that could potentially explain the regional growth paths, how these events have influenced specific organizations or the region, and which challenges and opportunities existed in the specific periods. Then, we zoomed in on concrete actions or interventions aimed at developing or grasping these opportunities or dealing with the challenges. Interviewees were asked to describe the actions in more details, including who was involved, at what geographical scales, what triggered the action, and why it was conducted. When then prompted on enablers and constraints of these actions, interviewees frequently referred to happenings before 2000, which influenced the context conditions. We finally covered intended and unintended outcomes of these actions, and enablers and constraints.

Most interviews in Ulsteinvik and Mo i Rana were conducted face-to-face and a few via videoconference. In Arendal, we conducted interviews via videoconference due to Covid-19. We think that the extensive local experience in Arendal of one of the authors compensated for the lacking fieldwork. In most of the interviews, two to three researchers were present, alternating questioning and note taking. All interviews but two were recorded. In an immediate analysis after each interview, we filled in common interview protocols linking back the detailed information to the theoretical framework. These data provided a solid ground to identify how change agency-actor constellations and external changes affected the observed changes in the region (research question 1), and how regional structural preconditions and external changes influenced the activation of the observed change agency-actor constellations (research question 2). The key categories in the analysis were thus theoretically informed and concerned with the RIS structures, the change agency-actor constellations, important external changes, as well as the development of the regional economy over the observation period. As regards the methodology, the main challenge was to move from the *actual* and *empirical*, such as specific events, actions exercised by single or a set of actors, and experiences (documented in the interview protocols), to the *real*, which refers to the structural embedding and agency as *causal powers* because the latter are not directly observable. This has been done in an analytical process where we iterated between the empirical material, the theory, and between the cases, triangulating between the varied and rich data sources (quantitative data, document analysis, interview data), in order to achieve a high degree of validity.

4 | EMPIRICAL FINDINGS

4.1 | The Arendal case

The Arendal region consists of five municipalities (Arendal, Grimstad, Tvedestrand, Froland, Åmli and Vegårshei) and has about 84,500 inhabitants. The population growth has been slightly lower than the national average since 2000. The number of jobs increased by nearly 500, or 1.5 per cent, from 2010 to 2019. This is a much lower rate than the national job growth of 7.3 per cent. Nevertheless, the Arendal region experiences larger job growth than expected after 2008. The explanation of the seemingly opposing situation of relatively small job growth but higher growth than expected lies in the fact that the region has a low growth advancing industry structure. Part of this is the overrepresentation of the generally declining manufacturing industry. The case study focuses on the oil and gas supplier industry and the IT and electronics industry. Both contain a mix of manufacturing jobs and engineering jobs and thus include activity within several statistically defined sectors.

The higher job growth than expected since 2008 reflects both external and internal developments. The oil and gas sector boomed until 2014, and local firms benefitted even some time beyond 2014 due to remaining orders. At the same time, we observe qualitative changes related to the long-term building of the RIS, which supported oil and gas supplier firms, and partly other manufacturing firms. Due to several municipality initiatives in order for Arendal to increase its role in regional development and through upgrading of the city center, also '*a more positive view of Arendal occurred, both among inhabitants and in Norway in general*' (leader of the industrial department in Arendal). Most important has been the organization of the so-called 'Arendalsuka', a week in August that brings together top politicians, organizations, HEIs, and industries in Norway for a large number of events and discussions in Arendal. It was initiated by the then County governor, an editor of the local newspaper and the leader of an Oslo-based advisory agency, supported by the Arendal municipality.

As regards the RIS, a quantitative study covering the period 2004–2012 concludes that Agder, including the Arendal region, was the only county in Norway where 'innovation activity was strengthened during the period and more of this activity was conducted in collaboration with local research system institutions' (Herstad & Sandven, 2017, p. 10). An OECD (2009) study mapped the innovation system in Agder and also concluded that the university campus in the Arendal region, with its engineering department, had considerable cooperation with the regional industry.

Knowledge organizations and knowledge diffusion have been strengthened since 2000. Important was the creation of a cluster organization for the oil industry spanning the Agder region, initiated by some firm leaders, in 2006, and which received the prestigious Global Center of Expertise (GCE) Status in the Norwegian support program for clusters in 2014. Further examples include the establishment of a test lab for robots and digital production (the Mechatronics Innovation Lab), a center for research-based innovation in offshore mechatronics, and a center for the development of e-health solutions, all established at the university campus in the Arendal region. Other examples are the creation of a technological R&D institute, and several incubators and other organizations, which support new firms with advice and financing. System-level actors were essential for building the RIS by acts of institutional entrepreneurship and place-based leadership. '*Several public initiatives aimed to build a strong regional research infrastructure*' (former leader of Regional Research Fund Agder). In addition, a number of innovative entrepreneurs are visible; some that created new firms in the wake of the downsizing of Ericsson's engineering

department at the start of the 2000s, some serial entrepreneurs in the oil supplier industry, and some recently started firms based on research on artificial intelligence at the university.

The building of a knowledge and support infrastructure in Agder and the Arendal region is to some extent a regional answer to (real or considered) external threats. The Ericsson engineering department with about 400 jobs downsized and closed down at the beginning of the 2000s (Isaksen & Trippl, 2017). A large producer of electronic components and some large oil supplier firms were taken over by large firms with headquarters outside the region. The hospital and the university campus, with many highly educated employees, have at times felt the threat of less investment and decreasing activity. In addition, the region, in particular Arendal city, was stamped as passive and somewhat intolerant, i.e., with a weak 'people climate', based on some media reviews (Andersen et al., 2010). This situation provided the basis for, and demanded, place-based leadership primarily from system level actors. A few persons at the East-Agder County council had long term strategies to support cooperation between academia and industry, and the building of research milieus (such as in e-health) at the local university campus. Several succeeding rectors at the university (from the local campus) engaged in institutional entrepreneurship and place-based leadership, which led to new study program and PhD-education in fields like mechatronics and ICT, partly in cooperation with some large firms and cluster organizations. These initiatives were supported by national policies, some of which were co-financed by the County where the region managed to gain support from national programs. The building of a stronger RIS and an improved 'people climate' are important reasons for why investors decided by mid-2020 to locate a new battery factory, estimated to have 2.000–2.500 jobs, in Arendal.

4.2 | The Ulsteinvik case

The Ulsteinvik labor market region is located in the coastal islands of Sunnmøre district in the western part of Mid-Norway. It consists of five municipalities (Ulstein, Hareid, Herøy, Sande, and Vanylven) and counts around 28.000 inhabitants. Although regional population declined by 1.7% in the period 2000–2007, it increased by 7.6% in the whole period 2000–2019. Compared to other Norwegian regions, Ulsteinvik experienced low employment growth 2000–2004, high employment growth 2004–2012, and a major crisis after 2014. The region has a strong tradition in shipbuilding originating from the closeness to the sea and fishing industry. The region is a global hub for the maritime industry, which, in terms of employment and value creation plays the biggest role in the region (Asheim et al., 2017). The maritime cluster encompasses all parts of the value chain and has the highest share of employment in the private sector. Since the 1970s, the focus rested on designing and building offshore service vessels for the oil and gas market.

The fluctuations in employment relate to changes in oil prices and the global demand for oil and gas offshore service vessels (Melkevik, 2018; OECD, 2017). Yet, in order to understand why the region could ride the offshore boom and how it has changed after the crisis, additional explanations surfaced in our analysis. First, the quick growth after 2004 cannot be explained without the early moves of major firms in the region. The shipping companies Island Offshore and Olympic Shipping ordered new service vessels in 2004 from the local yards, anticipating the growth of the market. The risks related to these first orders were shared in an unusual way between yards and shipping companies, illustrating a form of shared innovative entrepreneurship. These orders had a signaling effect for other actors kicking-off the boom. '*This started rumors and other actors started to order boats*' (previous shipbuilder and an actor within the regional support system).

In addition, in the early 2000s when the future of the maritime industry was questioned, major efforts were undertaken to enhance the regional support system leading among others to the establishment of the Ålesund Knowledge Park (ÅKP) in 1999, the most prestigious awards in the Norwegian cluster program (NCE in 2004 and GCE in 2014), developing a HEI system, and building a bridge and tunnel system to create a larger region (approved 2002). '*We have built a local ecosystem, i.e. from ideas to products and services... this did not exist before*' (a key actor within the regional support structure—entrepreneur support). These achievements rested on strong place-based leadership mainly driven by firm-actors but complemented with actors from the HEI sector and new leadership in the support structures. In addition, a Center for Research-driven Innovation (SFI) focusing on demanding maritime operations was awarded in 2014 from the Research Council of Norway being the result of institutional entrepreneurship and the merger of the local university college with the Norwegian University of Science and Technology in Trondheim, the leading technical university in Norway. These regional changes supported the growth after 2004 by building required competences, promoting local networks, increasing the labor market, lobbying, representing the region nationally and globally, and attracting inward investment.

Moreover, the regional economy during the period of low demand in the early 2000s as well as after the crisis in 2014 was strongly shaped by innovative entrepreneurship, spearheaded by the leading firms in the region. '*There is a local openness towards change, a strong collaborative character. This has been highly important in the process of change*' (one of the previous owners of a local shipbuilding company). After 2014 new markets were explored, including cruise ships, battery ferries, offshore wind, the last two connected to the emerging "green growth" agenda. We found it to be a typical strategy of firms to cut cost of current operations while investing in new markets for the long-term. Amdam, Bjarnar, et al. (2020) note that the search for new opportunities following hardship and downturns is part of the local "fishing village" identity. This explorative push highlighted in the interviews is supported by a doubling of R&D expenditures in 2015 and 2016 (Research Council of Norway, 2018).

The regional support structures bundled in the Ålesund Knowledge Park were no key players in the diversification efforts of firms. However, Ålesund Knowledge Park together with other local system-level actors set measures to keep qualified labor in the region. Furthermore, some system-level actors initiated a discussion about opportunities after the oil boom already before 2014, which was considered helpful by interviewees to react to the crisis more quickly. '*We foresaw that oil-based vessels where being built too fast (...) We started to think about the need to develop... change before the oil crisis*' (a key actor within the regional support structure). Also, an alliance across different actors, signifying place-based leadership, secured funding for diversification efforts (e.g. from GIEK, the Norwegian export bank) or for restructuring plans.

The strong agency in the region, mainly in the form of firm-led innovative entrepreneurship and place-based leadership, and to some extent institutional entrepreneurship has a long history and thus relates to the regional context conditions. While there are many individual acts of innovative entrepreneurship, one key event was the development of the UT Design in the 1970s, which allowed the Ulstein Group to break the US market dominance for offshore vessels. This signaled that world market leadership was possible. '*They were showing people that it is possible for small regions to grow and compete on world markets*' (previous shipbuilder and an actor within the regional support system). Innovative entrepreneurship became a continuous strategy for many local firms. Being innovative and entrepreneurial has become part of the regional identity (see also Amdam, Lunnan, et al., 2020). This was also corroborated by interview partners in the other two case study regions (Arendal and Mo i Rana) who pointed out Ulsteinvik as an example

of a region with a high level of entrepreneurship. Furthermore, firm-level actors have for a long time been engaged in place-based leadership starting with Martin Ulstein, founder of the Ulstein Yard in 1915, who was also mayor of Ulsteinvik. In the 1970s several leaders of firms cooperated to establish MAFOSS, an organization to supply competences for the Maritime cluster. Firm leaders saw an obligation to contribute to building the region, which in turn would also benefit them individually. Place-based leadership in the 2000s clearly built on these previous actions.

4.3 | The Mo i Rana case

The Mo i Rana region is located in Helgeland district in North-Norway and formed of three municipalities (Rana, Hemnes, and Nesna). The region is home to about 32.500 inhabitants. Although regional population declined by 0.5% in the period 2000–2010, it increased by 2.4% in the whole period 2000–2019. Compared to other Norwegian regions, Mo i Rana experienced low employment growth in 2000–2004, and high employment growth after that. The region is known for large-scale manufacturing industries located in Mo Industry Park (MIP), and its iron ore resources and mining industry. MIP hosts more than 100 firms, originating from the state owned Norsk Jernverk (Norwegian Ironworks, established in the 1950s). Following a long period of economic losses, Norsk Jernverk was shut down, dismantled, and sold to private actors in 1989. In order to cope with the strong rise in unemployment, the Norwegian state provided a massive five-year restructuring package, including the establishment of branches of several national public services (Grønlund, 1994; Jakobsen & Høvig, 2014). Also, national and local authorities avoided the exportation of locally produced hydropower, which secured affordable electricity important for the re-organization of the local process industry in the following years (Karlsen, 2000).

The variation in employment over time relates to the global demand for steel and mining, and to the growth in public employment. In qualitative terms, we identify three main changes: (a) increasing investments of international players, (b) the emergence of a regional innovation system, and (c) a strong growth in national public services located in Mo i Rana. After 2003, new international players entered the region, mainly because of the existing infrastructure and facilities, competences, a strong industrial culture, and local access to green energy based on hydropower. These companies bought local firms and made strong investments in facilities and new technology, leading to an upgrading of the process industries.

The emergence of a regional innovation system becomes apparent in the increased number of collaborative initiatives and projects funded for instance by the Arena cluster programme of Innovation Norway or the Programme for Regional Research and Innovation of the Research Council of Norway, which supported regional R&D and innovation by enhancing collaboration between firms and regional universities and research organizations. The origin of these activities can be traced back to the early 2000s when a few actors in Mo Industry Park[2] and Helgeland Sparebank (Helgeland Savings Bank—later Helgeland Invest) started to work toward establishing a systemic approach to building networks between actors. Important steps were taken in the period 2005–2011 when local ownership and management of Helgeland Invest and later majority ownership of MIP AS were secured, allowing for more locally focused funding- and development strategies. A key event was the establishment of Helgeland Knowledge Park (Kunnskapsparken Helgeland) in 2004 as a collaborative effort between, among others, local stakeholders, Nordland County, Innovation Norway, and the Research Council of Norway. Helgeland Knowledge Park has through its proactive place-based leadership and institutional entrepreneurship contributed to the development of a comprehensive and integrated support system. One of the first actions

initiated by Helgeland Knowledge Park was to connect people from the highly segregated sectors in the local economy. This was a key factor leading to the formation and development of future cross-sectoral networking and collaborations. '*This was the most important, we connected people, and that is why we made the slogan - Samspill skaper vekst (e. Collaboration creates growth) (...) These branch groups were the most important thing that we did. We visited them, and invited them to us, and we were discussing their needs. We were facilitating projects that they could participate in*' (previous key actor within the local support structure). This greatly increased collaboration between industry and research (see e.g. Karijord, 2016; Nilsen & Lauvås, 2018). In collaboration with other actors at the regional and national level, Helgeland Knowledge Park has lobbied for a local university campus (Nord University) and collaborated in the establishment of SINTEF[3] Helgeland and Arctic Cluster Team (ACT).[4] These support organizations are co-located at Campus Helgeland besides Nordland Research Institute and Rana Development Agency. As result of these actions, collaboration greatly increased between industry and research (see e.g. Karijord, 2016; Nilsen & Lauvås, 2018).

Furthermore, in the period from 2004 we find a strong growth of national public services.[5] The decision of the Norwegian state to establish branches of national public services in Mo i Rana as part of the mentioned restructuring package initiated this growth path. The national public services were small to begin with but grew beyond expectations primarily due to acts of innovative entrepreneurship. Capitalizing on IT competences developed by Norsk Jernverk before its closure, new digital solutions for national public services were developed and grew significantly. In addition, they innovated with services around the clock rooted in the tradition of a shift-culture developed in times of Norsk Jernverk. '*This was the jewel in the crown as they say, the computer department of Norsk Jernverk, which started very early with computer technology (...) Today, they are in the front in the world. They are cooperating with Cambridge and with Stanford in America, and they are in the top in knowing how to digitalize... and this could not have happened if they didn't have the industrial competence and culture (...) So, this way of thinking was a good and important thing for the years to come. So, we have proved that this is possible*' (local historian and previous MIP AS employee).

Most interesting in the Mo i Rana case is the emergence of change agency in the 2000s. Looking at the history of the region, the transition after the closure of Norsk Jernverk in 1989 was slow and painful. The Rana restructuring package was important but only secured part of the jobs lost during the closure of Norsk Jernverk (Grønlund, 1994). Institutional entrepreneurship and place-based leadership building a regional innovation system together with small-scale initiatives of firm-level actors worked against existing structural preconditions and increased momentum by including system-level actors. Equally, the innovative entrepreneurship in the national public services is not rooted in an "entrepreneurial culture". Rather opportunities were perceived in the industrial shift-culture and existing IT-competences, resulting in successful new services. In Mo i Rana, the regional context was, thus, not favorable for the activation of change agency. It took a long time, yet we find that initially small and almost invisible acts of change agency have grown over the last 15 years, with positive consequences for the development of Mo i Rana.

5 | CONCLUSIONS

In order to advance the literature on human agency, we make three main contributions. First, the paper addresses a shallow theorizing of human agency where some studies focus on individual

actions and others on the agency of organizations or systems, with limited explicit treatment how agency of individuals, organizations, and systems link together. We propose a stratified ontology of human agency, which integrates the agency exercised by organizations and systems (top-down causation) with change agency exercised by single or sets of individuals with the intention to alter organizations or systems (bottom-up causation).

Second, we propose an analytical framework to study change agency in RIS. The analytical framework identifies six change agency-actor constellations by interacting two dimensions: three types of change agency (innovative entrepreneurship, institutional entrepreneurship, and place-based leadership), which can be exercised by two types of actors (firm-level actors and system-level actors). Applying the proposed stratified ontology and analytical framework, the paper focuses on two theoretically derived research questions: (a) in what way and to what extent do specific change agency-actor constellations and external changes explain regional economic development and observed changes in RIS; and (b) in what way and to what extent do regional structural preconditions and external changes explain the activation of observed change agency-actor constellations.

We investigate the two research questions empirically using a comparative case study design with three labor market regions in Norway, which is the third contribution of this paper. Overall, regional development in the three cases presented itself in the combination of regional and extra-regional forces (see Figure 4). Extra-regional forces related to changes in global demand or actions of national (particularly policy makers) or international (particularly multinational corporations) players, which interacted with local context conditions, and the agency of regional stakeholders to shape regional trajectories. As regards the first research question, the evidence clearly supports that human agency substantially shaped the observed changes in the regional economies during the last 15–20 years. Yet, the change agency-actor constellations were different with an emphasis on place-based leadership and institutional entrepreneurship by system-level actors in Arendal, a strong presence of innovative entrepreneurship and place-based leadership by firm-level actors in Ulsteinvik, and the emergence of the three change agency types among firm- and system-level actors in Mo i Rana. In Arendal, this has led to the development of a more networked and integrated RIS, an improved perception of Arendal by locals and nationally, and consequently to more innovative entrepreneurship largely targeting new fields in ICT and green energy. In Ulsteinvik actions of innovative entrepreneurship sparked the growth of the maritime industry and were heavily pushing diversification after the oil crisis. Firm actors drove the development of regional support structures, even though system-level actors became increasingly involved. In Mo i Rana, institutional entrepreneurship and place-based leadership from initially few firm-level actors and then strongly carried out by system-level actors over time, led to the building of a strong RIS, which contributed to the investments of MNCs in process industries. Furthermore, innovative entrepreneurship related to digitalization and e-governance within established national public services by local actors led to a strong job growth in those services.

With respect to the second research question, the cases unveil that the regional context plays an important role in the activation of change agency. In the Ulsteinvik case, the strong presence of innovative entrepreneurship and place-based leadership is rooted in a collaborative and entrepreneurial culture, which was formed over the last 100 years. In contrast, the slow emergence of change agency (despite a clear demand for it) in Mo i Rana can be explained by the lacking preconditions for such, a history of relying on a large, publicly owned firm and a dominant wage labor lifeform (Højrup, 1984). In the case of Arendal, we find a clear call for place-based leadership due to perceived threats, which system-level actors took on, partly due to the more passive stance of firm-level actors as compared to Ulsteinvik.

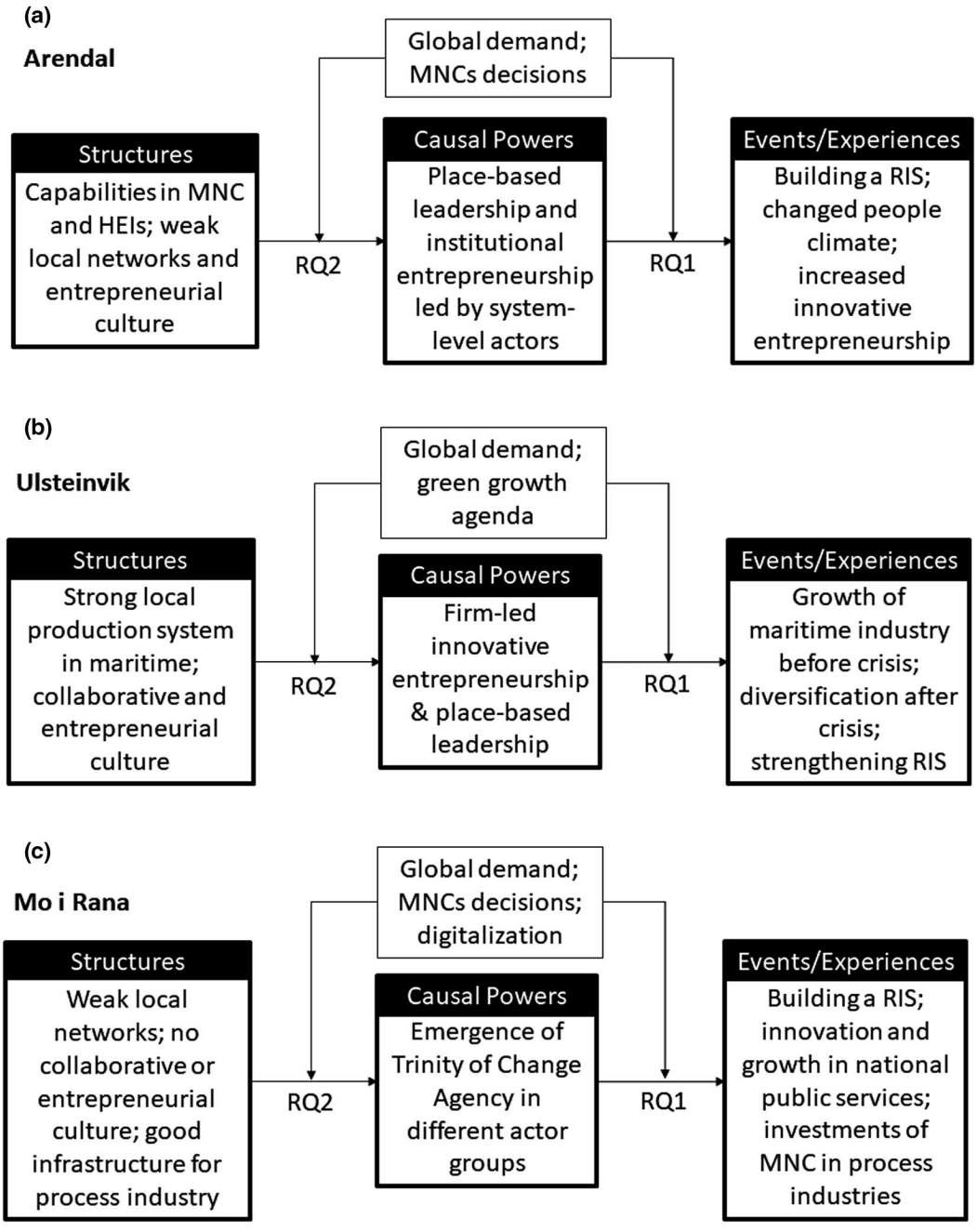

FIGURE 4 Summary of findings

Yet, the findings also show that regional contexts do not determine the agency patterns. While in the Ulsteinvik case, the agency patterns can be explained by history, both Arendal and Mo i Rana do not build on a similar legacy. The situation of real and perceived threats in these two regions called for change agency. The preconditions, however, were not favorable in Mo i Rana. We could trace the initiation of local change agency to minor initiatives of a few individuals, which increasingly gained momentum, leading to a substantial change in the region over a longer run,

materializing in opportunities provided at the national level (e.g. concerning e-government) or through inward investments by multinational corporations. While the preconditions in Arendal were better than in Mo i Rana, it has also been the long-term engagement of key individuals that was essential in building a RIS.

The empirical work demonstrates that the proposed analytical framework of change agency-actor constellations is a useful tool to study regional industrial development. It shows that such analyses demand detailed studies of actors' agency embedded in specific contexts in time. The stratified ontology also circumvents shallow theorizing and provides the foundation for empirical analysis appreciating both the effects of change agency on regional development and how the context conditions influence the activation of change agency. Yet, such a critical realist epistemological-theoretical approach holds more potential to be exploited in future research. First, it is suggested to advance the conceptualization of context conditions, which promote or hinder the activation of change agency, e.g., distinguishing between spatial scales (local, regional, national, and international), types of conditions from tangible (e.g. support infrastructure) to more intangible (e.g. informal institutions), and integrating perspectives on how phenomena change over time (e.g., cluster and industry life-cycles).

Second, further work is needed to link human agency to observable regional development outcomes. While we found this link to be evident for the qualitative changes observed in the three cases, it is less evident for the aggregate fluctuations in regional employment or potential other variables such as value added. We observed a co-occurrence of unexpectedly high or low employment growth, fluctuations in global demand, change agency, and qualitative changes in regional economies. Without comparisons including more cases, we cannot conclude which of these conditions are necessary or sufficient to produce the aggregate employment outcomes (Ragin, 1987). Furthermore, it is difficult to trace the various effects quantitatively. For instance, we found that some IT firms switched from customers in the oil and gas sector to e-health. Internally, employees worked in different markets, but this does not show in statistics. Furthermore, the time perspective is important. When tracing the emergence of change agency in Mo i Rana, we found that it took 10–15 years until substantial changes in the region occurred. Toward the end of the period, we also identified new and established firms moving into new fields such as automatization and artificial intelligence. Finding a way of tracing such changes could link the qualitative approaches applied in this paper with quantitative approaches (and vice-versa), and thereby strengthen our understanding how human agency affects regional growth trajectories.

Third, unused potential lies in paying more attention to unintended and potentially unwanted consequences, which a deep theorizing of human agency allows for. In the Ulsteinvik case, firm-level and system-level actors aligned and exercised strong innovative entrepreneurship and place-based leadership. This made possible the exceptional performance in the maritime sector measured at a global scale. Yet, one unintended and unwanted consequence was that some new firms and activities addressing other markets did not receive sufficient attention, which left the region vulnerable to changes in global demand. In the case of Mo i Rana, even though investments of MNCs in the process industry was welcomed, such firms organize innovation activities often within the organization globally with a focus on process and product innovation, which makes it more difficult to establish innovation collaborations locally. In Arendal, we find similar unintended and unwanted consequences as in Ulsteinvik and Mo i Rana, but at a lower scale. For instance, the strong presence of MNCs in Arendal has been an asset but also induced some vulnerability (e.g. closure of Ericsson) and barriers for local innovation collaboration. We actually found that the withdrawal of Ericsson offered some unintended but wanted consequences in

terms of creating some local ICT firms that could operate and access markets more flexibly than before. Also, even though local stakeholders in Arendal successfully built a RIS, there is also a tendency to focus it too much on the existing industries, paying too little attention to new potential industries.

This then finally leads to some reflections about policy. One of the key advantages of a human agency-based approach is that it focuses on what human actors can do to shape regional development trajectories. Structures that are given at specific points in time can be changed with long-term, strategic engagement of human actors. The empirical material of the three cases covered in this paper suggests that over 10–15 years, initially isolated actions intended to make a difference can gain momentum and finally change regional structures. Such momentum typically appears in an increasing engagement of both firm-level and system-level actors. It also shows when one type of change agency is triggering another one as implied by the TCA. For instance, when institutional entrepreneurship leads to better preconditions for innovation, consequently activating innovative entrepreneurship.

The results point toward unexplored potential of a more agency-focused and soft approach to regional policy making. Regional policy makers are important actors who typically have the mandate to invite other actors for joint discussions, for instance in participatory planning processes. Based on our results, regional policy makers may consider going a step further and take deliberate actions to promote the emergence of change agency. This entails to encourage other actors to engage in change processes, and to support these actors in order to build momentum for change, and thereby regional policy actors may play an active role in structural change processes. For regional policy makers, it is also important to know that any of the six change-agency actor constellations identified in the analytical framework can potentially spark a process transforming regional systems over time. Depending on the regional preconditions, regional policy actors have thus the possibility to reflect upon and experiment with different strategies to promote the emergence of change agency. At the same time, a human agency-based approach to policy making would also caution policy makers to pay attention to potentially conflicting interests between actors as well as the unintended consequences of individual actions for regional development. One role of regional policy makers—as place-based leaders—would then be to lead a dialogue with other stakeholders about which course of action will be of benefit for the region as a whole in the long-term.

ACKNOWLEDGMENT

This research was supported by a grant from Länsförsäkringar Alliance Research Foundation, Sweden (ReGrow - Regional Growth Against all Odds, Grant Number: 2017/01/011) and VINNOVA, Sweden (An experimentally organised economy, Grant Number: 2018-04797).

DATA AVAILABILITY STATEMENT

The quantitative data that support the findings of this study are available from the corresponding author upon reasonable request. The interview data cannot be made available for ethical concerns.

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ENDNOTES

[1] Other relevant growth variables such as value added growth were not available to us. Value added growth would capture productivity gains in a better way. Yet, we consider that employment growth is a relevant and widely used growth measure.

[2] Mo Industry Park AS is the organization that owns and manages the infrastructure at Mo industry park area and coordinates internal development and outwards interactions.

[3] SINTEF is an applied research institute (the largest in Northern Europe) closely linked with the Norwegian University of Science and Technology (NTNU).

[4] For further info, go to https://arcticclusterteam.no/about-act/

[5] These included the Norwegian National Broadcasting Licence Office, the National Collection Agency (today the Norwegian Tax Administration), the Post Office Ticketmaster System, NAV service center (the Norwegian Labor and Welfare Administration) and the digitalization- and digital storage section of the National Library (Nasjonalbiblioteket).

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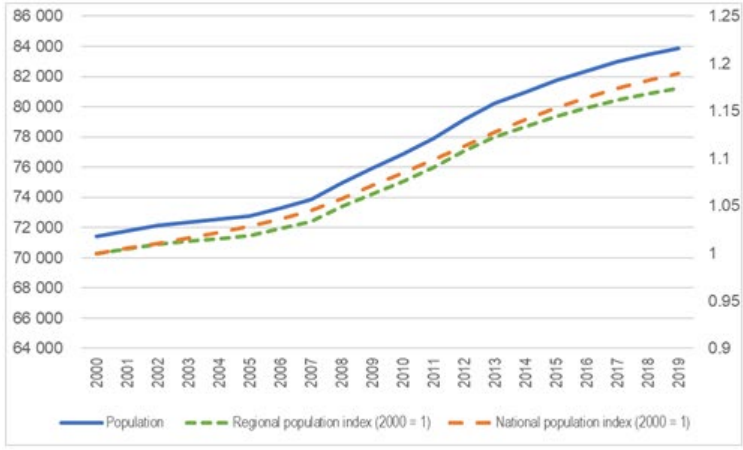
How to cite this article: Grillitsch, M., Asheim, B., Isaksen, A., & Nielsen, H. (2021). Advancing the treatment of human agency in the analysis of regional economic development: Illustrated with three Norwegian cases. *Growth and Change*, 00, 1–28. https://doi.org/10.1111/grow.12583

ANNEX 1

Population, employment growth, and residuals of the regional growth regressions for Arendal, Ulsteinvik and Mo i Rana

Arendal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80 000
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74 000
72 000
70 000
68 000
66 000
64 000
1.25
1.2
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1
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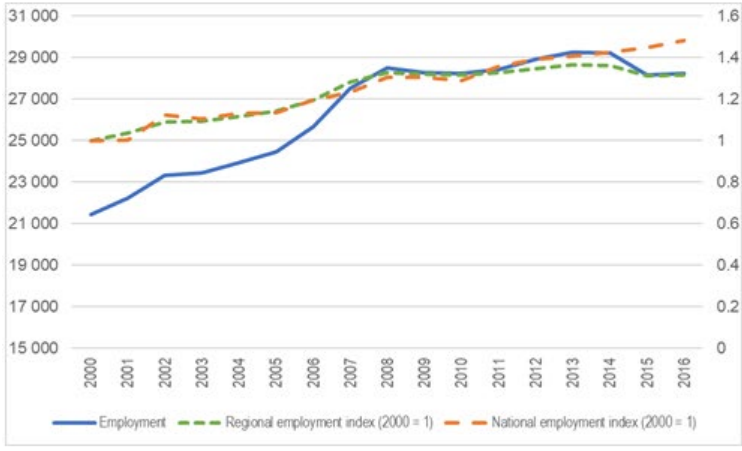
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019
Population
Regional population index (2000 = 1)
National population index (2000 = 1)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29 000
27 000
25 000
23 000
21 000
19 000
17 000
15 000
1.6
1.4
1.2
1
0.8
0.6
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2000
2001
2002
2003
2004
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2006
2007
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2009
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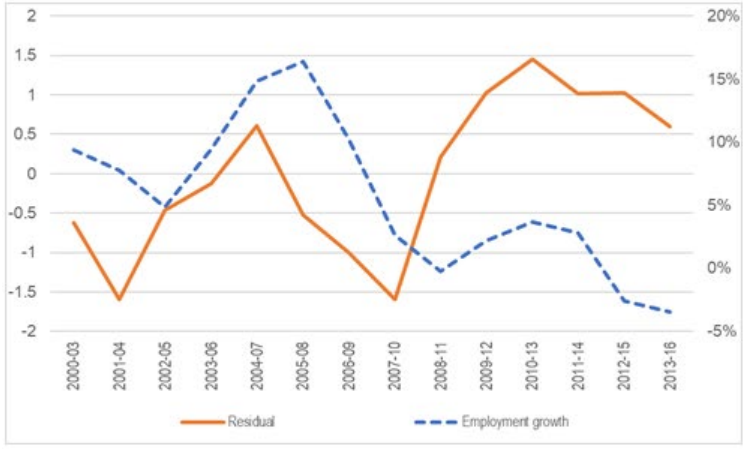
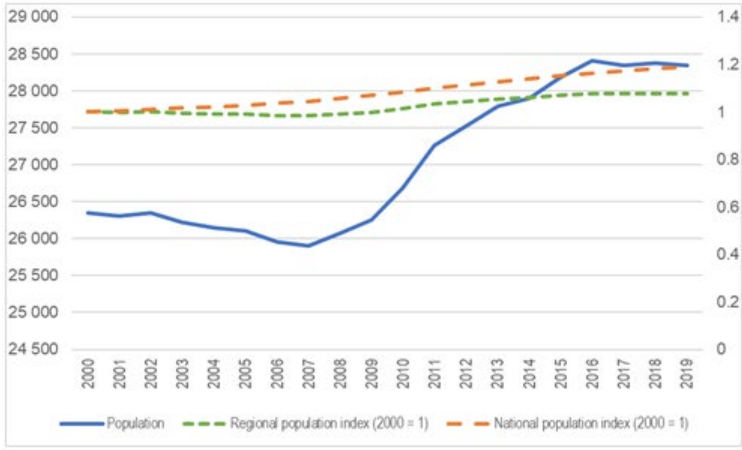
2011
2012
2013
2014
2015
2016
Employment
Regional employment index (2000 = 1)
National employment index (2000 = 1)


2
1.5
1
0.5
0
-0.5
-1
-1.5
-2
20%
15%
10%
5%
0%
-5%
2000-03
2001-04
2002-05
2003-06
2004-07
2005-08
2006-09
2007-10
2008-11
2009-12
2010-13
2011-14
2012-15
2013-16
Residual
Employment growth

Ulsteinvik


29 000
28 500
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27 500
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26 000
25 500
25 000
24 500
1.4
1.2
1
0.8
0.6
0.4
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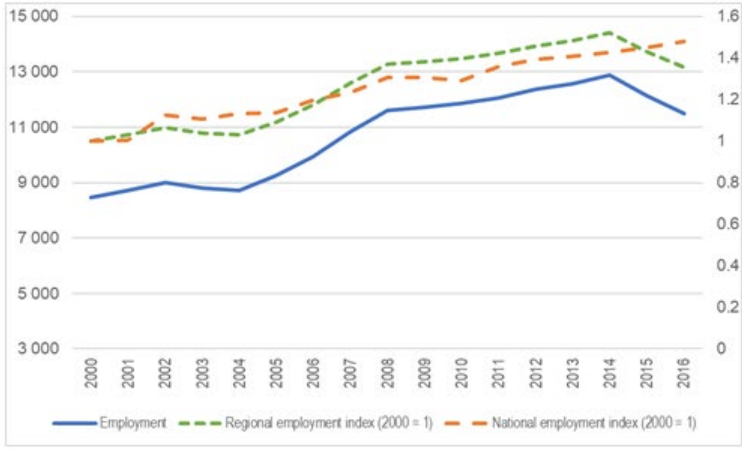
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019
Population
Regional population index (2000 = 1)
National population index (2000 = 1)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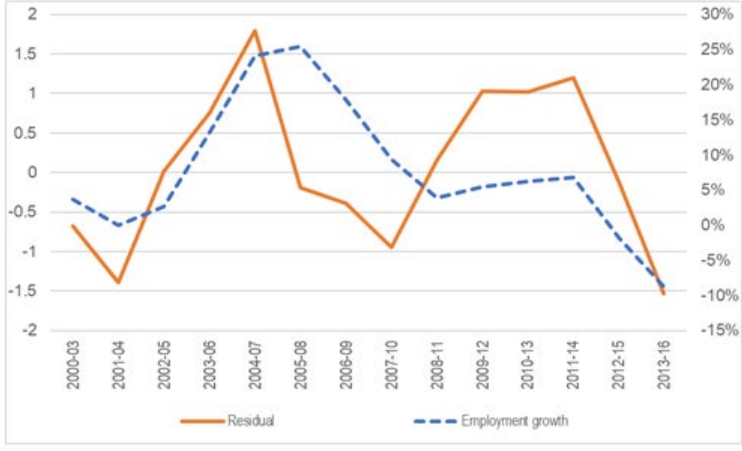
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016
Employment
Regional employment index (2000 = 1)
National employment index (2000 = 1)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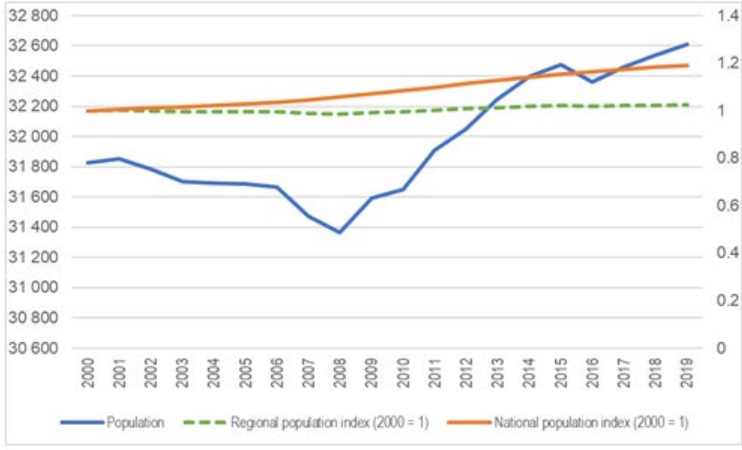
-0.5
-1
-1.5
-2
30%
25%
20%
15%
10%
5%
0%
-5%
-10%
-15%
2000-03 2001-04 2002-05 2003-06 2004-07 2005-08 2006-09 2007-10 2008-11 2009-12 2010-13 2011-14 2012-15 2013-16
Residual
Employment growth

Mo i Rana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32 400
32 200
32 000
31 800
31 600
31 400
31 200
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30 800
30 600
1.4
1.2
1
0.8
0.6
0.4
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0
2000
2001
2002
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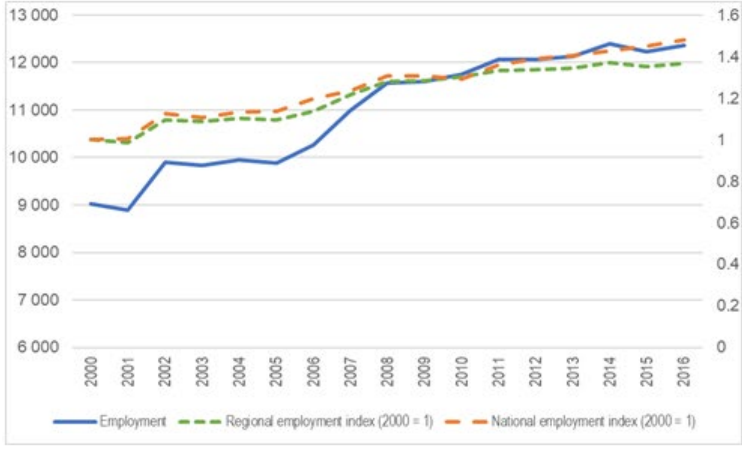
2018
2019
Population
Regional population index (2000 = 1)
National population index (2000 = 1)


13 000
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1.6
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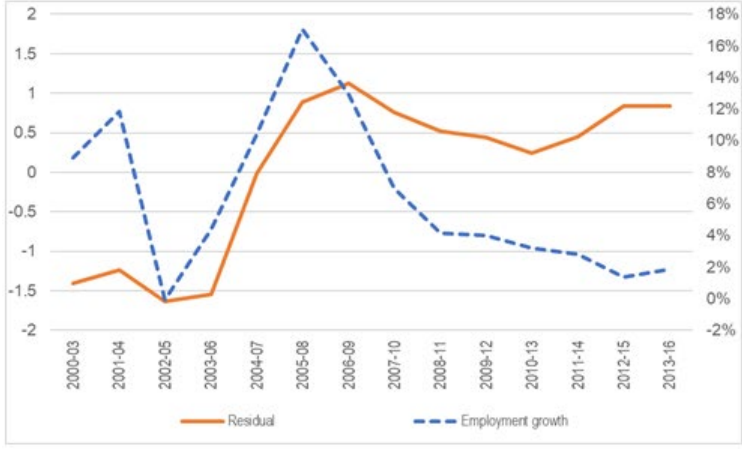
Employment
Regional employment index (2000 = 1)
National employment index (2000 = 1)


2
1.5
1
0.5
0
-0.5
-1
-1.5
-2
18%
16%
14%
12%
10%
8%
6%
4%
2%
0%
-2%
2000-03
2001-04
2002-05
2003-06
2004-07
2005-08
2006-09
2007-10
2008-11
2009-12
2010-13
2011-14
2012-15
2013-16
Residual
Employment growth

ANNEX 2

Number of Interviews per type of actor and region

Type of actor	Arendal	Ulsteinvik	Mo i Rana
Firms	4	10	8
Local- and regional government	3	3	1
Support organizations	4	6	8
HEI	3	1	1
Total	14	20	18