

The underdogs of geographical categorization

Shifting understanding of peripheral regions towards a human-agency approach

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Summary

This thesis examines the concept of the ‘periphery’ – or so-called left-behind places – in the Netherlands. The point of departure is that this spatial categorization fuels geographic polarization while negating the complex realities of regional development. In both academic and societal debates, the concept of ‘periphery’ is typically employed in overly simplistic and structuralist ways. Regions are often labelled ‘peripheral’ based primarily on their distance from a predefined core or on standardized indicators of underperformance. This reduces places to being merely left behind, marginalized, underdeveloped; the underdogs of geographical classification.

Such binary thinking, common in both policy and academic discourse, tends to mask the relational, dynamic, and human-driven nature of regional change. By labelling certain areas as ‘peripheral’, we risk erasing the nuanced processes and forms of agency that shape these regions. This thesis critiques these dominant frameworks for failing to account for the actions of humans that drive regional trajectories.

To move beyond these limitations, this thesis engages with core–periphery dynamics as opposed to categorizations, while resisting solely structuralist interpretations. It incorporates a human agency approach, recognizing that individuals in so-called peripheral regions actively shape the economic, social, and institutional structures around them. The goal is not simply to categorize space, but to develop a deeper, more relational understanding of how regions come to be seen as ‘left behind’ or ‘peripheral’.

Central to this approach is the concept of economic path development, which serves as a lens for analyzing regional evolution. This framework allows for a more nuanced understanding of core-periphery dynamics. Not based solely on static indicators, but on the diversity and strength of their developmental trajectories through human actions. For example, regions with strong and varied path developments—such as robust local firms, innovation capacity, or institutional adaptation—tend to be more resilient and economically dynamic. Conversely, regions with weaker or less differentiated paths may be more vulnerable to economic shocks and transformations, often reinforcing their ‘peripheral’ status.

By integrating human actions into the analysis of economic path development, this thesis offers a richer, more grounded understanding of peripherality. It reveals how place-specific practices, capacities, and adaptations can challenge or reinforce structural categorizations—ultimately complicating the idea of the left-behind region and offering new insights into the future of regional development.

How regions perform in terms of path development is closely tied to the opportunities available within them; opportunities that are shaped not only by structural conditions but also by the actions of individual agents, and the networks of knowledge and material linkages they form. This study employs the trinity of change agency model to analyze human agency in regions. This model identifies three types of agents who collectively shape the opportunity spaces for future path development and diversification. The notion of opportunity space sheds light on core-periphery dynamics are often limited or underdeveloped in regions commonly labelled as ‘peripheral’.

Rather than attributing agency to individual traits or capacities of human actors, this model locates agency within the relationships between agents and structures. The analysis considers

regional preconditions, focusing on the distribution and differentiation of actors across sectors, organizations and businesses, and the possibility for the emergence of opportunity spaces. This relational understanding of agency allows for a more dynamic conceptualization of regional development, while maintaining a degree within the regional context of this study; the Dutch province of Gelderland.

To operationalize this approach, the thesis combines a quantitatively-informed case study analysis assisted with an open interview (the case study approach on human agency), set against a separate analysis of structural indicators (statistical analysis of structure). This dual approach provides both a general overview of what might structurally constitute ‘peripherality’ in the Dutch province of Gelderland and a more inductive, human-centered analysis of regional dynamics. The human agency lens enables a deeper understanding of how actors reshape their structural environments, giving better understanding of the conceptualization of ‘periphery’

Findings from the structure-based analysis reveals some disparity within the province, particularly between the eastern region of the Achterhoek and the rest of Gelderland in terms of demographic indicators. This divide echoes patterns commonly found in geographic literature that supports the ‘periphery’ label. However, the majority of socioeconomic indicators show no clear spatial trends, not even a consistent urban–rural divide. This suggests that the geographic distribution of indicators typically associated with peripherality is irregular and cannot be captured through binary geographic classifications. As such, relying solely on structural indicators offers an incomplete and potentially misleading view of spatial dynamics.

Moreover, the data does not support the common assumption that distance from the Randstad automatically means for those regions to be underdeveloped or ‘left behind’, with the exception of age-related variables, notably in the Achterhoek. What emerges more clearly is the relational character of core–periphery dynamics: areas of concentrated economic activity often correspond with surrounding areas of lower economic activity. For example, larger cities or industrial centers can drain economic potential from nearby regions. Yet this pattern is not uniform, and its visibility depends heavily on scale, demonstrating the scalar nature of regional relationships.

The case study analysis on human agency adds significant explanatory depth. While the structure-based findings identify potential threats to regions, the agency-based analysis uncovers why these regions may be constrained in their development because of limited opportunity spaces, over-reliance on specific sectors or firms or dependency on other regions. In regions like Rivierenland and the Achterhoek, such dependencies like reliance on logistics or production could pose future vulnerabilities. In the Achterhoek this dependency could also be linked to the regional structure and its Geographic disadvantage.

This study contributes to a more nuanced understanding of regional complexity and what it means to be ‘peripheral’ by contributing a shift to more agency-based approaches. Crucially, peripherality is not a fixed definition, nor is it a useful typology for categorizing regions. Rather, what matters are the relationships of actors within and between regions, which shape their development pathways and future opportunities. These relationships might be captured in the earlier mentioned ‘core-periphery’ dynamic. Some regions face structural and relational disadvantages, which often leads to their categorization into the ‘periphery’, but these are not static. Regions that can strategically leverage their connections to other places are better positioned to diversify and strengthen their path development and escape the common categorization of ‘peripherality’.

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Preface

From mid-February to June 2025, I dedicated myself to exploring a topic that has long fascinated me: geographic categorization. As humans, we constantly make sense of the world by categorizing space. Yet, in doing so, we inevitably lose some of its complexity. This simplification can shape how we perceive places, some are associated with opportunity and progress, while others are linked to stagnation or decline. This thesis focuses on one such form of spatial categorization: the core–periphery divide. Although this division is multiscalar -appearing across global, national, and regional levels – I concentrate on the regional scale. My choice reflects a personal and academic interest in geographic polarization, an issue that has become increasingly prominent in public and political discourse in recent years.

What also draws me to this topic is how it intersects with the field of economic geography. Economic geography not only helps explain why certain regions thrive while others struggle, but also how spatial narratives like those of being ‘left behind’ or ‘peripheral’ are constructed, reinforced, and challenged. I find it interesting how economic geography combines spatial thinking with questions of inequality, development, and agency. It provides the tools to critically examine conceptualisations of places and the real-world consequences these narratives can have for regional policy, identity, and opportunity.

I would like thank Dr. Harry Pettit who assisted me with his guidance and experience in the preparation and execution of my research project. I also would like to thank Dr. Martin van der Velden for counselling on quantitative methodology which greatly strengthened the analytical foundation of this study. Finally, I would like to thank Dominique Brinkhorst for the insightful interview, which provided a valuable perspective for my research.

I wish you much enjoyment in reading this thesis.

Best,

Thur Klaassens

20-5-2025

1. Introduction

1.1. Introduction

Perceptions of polarization in the Netherlands appear to be increasing. According to a recent study by Edelman (2023), 80% of Dutch respondents believe that their country is more divided today than in the past. Similarly, research on social cohesion and welfare in the Netherlands indicates that people increasingly perceive there to be conflict between different social groups (Geurkink & Miltenburg, 2023). Prominent axes of division include political orientation, income level, migration background, and educational attainment (Groot & de Groot, 2011; Vermeij et al., 2024). According to the Dutch Social and Cultural Planning Office, 75% of Dutch inhabitants perceive polarization to be increasing, although polarization in their own living environment is perceived to be less (SCP, 2022). There seems to be a difference in perceived polarization ‘out there’ as opposed to in the direct living environment of the subjects (Muis, 2024).

Whether polarization really is increasing is difficult to know. However, what we can know is public opinion on the matter. One of the clearest forms of public opinion on polarization is the increasing attention on its spatial manifestation such as the city ‘versus’ the countryside. Indicated by recent politicization of the countryside that is evident from the policies of the new (now fallen) administration, electoral shifts as seen from provincial elections as well as countrywide elections, ideas for reformation of the electoral system (Voerman, 2025) and academic attention (de Lange et al., 2023; Huisman, 2024; van Vulpen et al., 2024), people in remote areas in the Netherlands feel left behind by the elites in the central administrative regions (Latten, 2017).

Furthermore, next to political beliefs, socioeconomic status, and cultural norms; educational attainment plays a significant role in the growing disparities and polarization within the Netherlands (Bovens et al., 2014). This polarization is particularly evident in spatial terms. For instance, rural areas in the Netherlands tend to have lower levels of educational attainment compared to urban centers, which also correlates with income differences. This spatial polarization has intensified in recent years (De Voogd, 2015; Latten, 2017), also leading to changes in perceived values between people in different geographic regions (de Voogd, 2021).

These societal transformations and perceived polarizing trends align with broader global Geographic developments, whereby individuals increasingly migrate from rural regions to urban areas in pursuit of education, professional advancement, and creative opportunities within the context of the globalized knowledge economy (Glaeser, 2012). In countries such as the United States, Canada, and the United Kingdom these processes also take the form of political divisions in Geography (Rodden, 2019). According to Sjoerd Beugelsdijk, a scholar at the University of Groningen, polarization in the Netherlands possesses a pronounced socio-economic and geographic dimension. He describes a dynamic of ‘winners’ and ‘losers’ in an increasingly globalized world. Where the winners are highly educated, high-income urban residents, while the losers are lower-educated, lower-income individuals residing in rural areas (Beugelsdijk, 2021). Similarly, Radboud University geography alumnus Josse de Voogd emphasizes the connection between geography and political polarization. His research suggests that parliamentary democracy may fail to adequately represent certain groups – particularly those with lower income and education levels living in so-called ‘left behind’ regions (de Voogd & Cuperus, 2021).

Looking broader, outside the scope of the societal transformations and polarisation in the Netherlands, we can see a bigger global trend. There is a spatial manifestation of polarisation, and it often gets the form of an ‘urban vs rural’ divide (Dekker, 2022). Within research on spatial

polarisation, this divide is studied quite extensively. Many times the terms core and periphery are attributed to the urban and the rural. The core is widely considered as an area with high economic activity, highly educated people, and demographic growth, whilst the periphery is often defined as an area far away from the core. However, peripheral areas are also defined by their lack of economic activity, demographic backlash and outmigration, and lacking infrastructure and other public goods (Rodríguez-Pose, 2018).

Central to the abovementioned information is that people tend to categorize space, often in a binary manner. The reason may differ, as some may categorize space to make more sense of the world around them. While others may have a predesignated goal, for which a spatial categorization may be useful. I think of politicians who try to reach voters or businesses who try to find their best location, but also academics trying to model space. The object of this research is this categorization of space, which in many instances does not do justice to the true complexity of regions and might even lead to further spatial polarization.

1.2. Problem statement

The academic conceptualization of space is closely linked to societal trends and political debates. Space is thus not static but socially produced and imbued with political, economic, and ideological relations (Lefebvre, 1991). People tend to categorize space to make navigating the world easier or use it as a means to achieve a certain goal. As geographers, we need to be critical of the conceptualizations of space that are present and how people use this to categorize spaces and people within them. As I mentioned, we categorize space into the 'rural vs urban', or between 'the leaders and left behind'; the 'winner vs the loser'. This categorization doesn't come from thin air. A logical explanation would be that this is an easy categorization; conceptualizing two poles, often used in Geographic research. It is a comprehensible model to categorize 'us vs them', or a 'winner vs loser'. Although this model may give a quick understanding – or rather a categorization – of space. It does no justice to the complexity of societal and academic debates, regarding topics such as spatial polarization.

Much geographic work has focused on the dynamics within the core in relation to the periphery as a way to understand spatial inequality and polarization. Probably most notable is Emanuel Wallerstein's (2011) core-periphery model of states under the capitalist world system. Fundamental scholars within the subfield of economic geography Myrdal (1957) and Krugman (1991) have laid the foundations of understanding economic processes within the core regions. These core economic processes would be the main drivers for spatial inequality and polarization between the core and the periphery, creating a structural dependency between regions. Within these perspectives, it is often the result of this structure that the categorization of certain spaces into the periphery is created.

The term periphery is often associated with negative connotations, such as underdevelopment, limited innovation, or stagnation, which reinforces a dualistic contrast with the generally positive portrayals of dominant core regions (Keim, 2006; Kühn, 2015). The concept of the periphery is commonly linked to portrayals of regions facing demographic and economic challenges, including population decline, reduced access to (public) services, economic marginalization, the out-migration of young and well-educated individuals, and an aging or socially disadvantaged population (Beetz et al., 2008; Leibert & Golinski, 2017). Within the Dutch context the similar notion of 'krimpgebieden' (shrinking areas) is often mentioned to portray regions with declining population (Drent & van Lanen, 2020). These images build a sharp contrast to cities, which are

predominantly considered to be “places of connectivity, creativity, and innovation” (Florida, 2012; Shearmur, 2012).

Even in more recent academic work, the periphery is often dismissed as ‘left behind’, as an effect of core dynamics. The periphery is perceived as ever-changing but still subordinate to the structural constraints of the core. The term ‘left behind places’ has come up lately to display this dynamic of regional marginalization. It tries to describe spaces that are negatively affected by austerity, globalization, and technological change (Pike et al., 2024). These places are often characterized by relatively lower levels of economic growth, demographic vitality, and social development compared to more dynamic and prosperous regions. However this term often still does no real justice to the complexity of these regions.

These perspectives suggest that discussions surrounding peripheral regions are often shaped by simplified dichotomies such as rural versus urban, core-periphery, declining–growing, or passive–active (Lang et al., 2015). Such binary frameworks contribute to the framing of non-urban areas as peripheral (Leick & Lang, 2018; Plüschke-Altöf, 2017). These representations appear to be shaped in contrast to dominant conceptions of urban culture (Willett, 2016). While peripheral regions are often conceptualized as lagging, lacking political influence, or being dependent on urban ‘cores’ (Kühn & Lang, 2016). People’s economic, social, and political abilities—and their role in changing these kinds of narratives are often overlooked.

This dismissing of the complexity of space is also present in much Dutch theorizing about core-periphery dynamics and spatial inequality or polarization. There is a tendency to view space in a dialectic manner; a ‘core’ vs a ‘periphery’ or a ‘winner’ vs a ‘loser’. This distinction might be useful for research but only in the case that it is conceptualized adequately. This is not what is happening. The core is often viewed as economically upward, or simply an urban area, whilst the periphery is the opposite of that. These conceptions aren’t just simple and not well thought through, they also rely too heavily on structural preconditions with no clear theoretical or philosophical underpinnings. These works often fail to understand the complex dynamics within the periphery and the opportunities within them. This leads to these areas solely being a category instead of a dynamic complex of human relations that has the possibility to escape this categorization. Moreover, such labels are often not only applied to regions themselves but also people within them (Meyer & Miggelbrink, 2013). As a result, people in these regions are often imaged as lacking in agency or being characterized as backward, conservative, apolitical, or even reactionary (Landy & Moreau, 2015).

1.3. Research aim, research question, and hypothesis

This research aims to look at space – in this instance regional ‘peripheries’ – more critically. To do more justice to the complexity of space beyond the structural conceptualizations of regions in terms of solely core and periphery indicators. I want to come up with an improved understanding of what it means to be ‘peripheral’ so that the focus is not as much on the polarizing dualism but more on the complexity and relatedness of space. As will become clear in the later theoretical framework, there is a lack of understanding of the heterogeneity of ‘peripheries’, or ‘left behind places’. Especially the actions that humans have in shaping space are often overlooked, leaving a structure-dominated approach to conceptualizing the ‘core’ and ‘periphery’. By structure-dominated I mean the emphasis on solely geographic distance to some pre-defined ‘core’. Or the emphasis on various measurable variables indicating peripherality or ‘left behindness’. These ‘peripheries’ are often viewed as subordinate or lacking in a structured ‘core-periphery’ dependency, whilst there is a complex dynamic of human-driven relations shaping these regions.

I want to bring a revised understanding of ‘peripheries’, using an approach that considers inner-periphery complexities shaped by human actions. This approach will try to do justice to the heterogeneity of these places by looking at the processes shaped by human actions that relate to the common categorization of spaces into ‘cores’ and ‘peripheries’. As will become clear in the following chapters these human-shaped processes often have an economic emphasis based on characteristics of ‘peripherality/left behindness’ like productivity, innovation, regional opportunity spaces, and economic path developments. These terms will be explained in the following chapters.

This research aim leads to the following research question:

How can a human-agency-based approach be used to revise understanding of regional peripherality within the Netherlands?

What this research will show is that the concept of ‘periphery’ does not suit the complexity of regional inequality. But, when shifting conceptualizations from purely structural indicators or solely geography towards more agency-based methods, a better, multilayered understanding of what it means to be ‘peripheral’ can be made in which the emphasis is not solely on the region or the categorization itself, but rather the relations to other regions and the human agents within them. This research will show the multiscalar nature of ‘peripherality’ and that ‘peripheries’ are not just regions on their own but incorporated in a network in and between regions. Furthermore, it is the categorization of ‘core’ and ‘periphery’ – or whatever dualistic description – itself that fuels the geographic polarization of space, not only in academia but also in societal debates. With this contribution, more adequate analyses of spatial polarisation can be made which take into account the dynamic complex that is space beyond structural indicators towards more human agency incorporated.

1.4. Relevance

The starting point for the subject of this thesis is geographic polarization, a phenomenon that has spiked my personal interest over the past years. The reason why it has interested me is among others the recent politicization of the countryside. This is visible in the news, in which reporting of regional resentments and discontent are making headlines, but also in one-on-one conversations with people I know. In these conversations, I notice growing differences between the values of people from cities or urban places, as opposed to people from the countryside. What interests me the most, which is the fuel for this thesis, is the spatial categorization we use, which is fundamental to any form of geographic polarization or geographically differentiating values. Some people make mentions of ‘city dwellers’ others of ‘urban elites’. People from non-urban areas are quickly considered ‘farmers’ (boeren). This geographical categorization is what interests me.

During the early stages of research for this thesis, I noted the emphasis on core and periphery within Geography and other academic subjects. Since then, this has sparked my interest. There is a clear categorization based on performance. The winner (the core) and the loser (the periphery). This divide is in many ways related to spatial economics, which is what this research focuses on. I have made the connection between this categorization and the recent geographical polarizing trends in society.

In this way, this research is about being critical of conceptualization and categorization. This means that utilitarian relevance is sometimes hard to find. However since this research looks at the processes shaping peripheries and non-peripheries, some useful insights can be extracted as to what kind of spatial-economic policy might be necessary to not become ‘peripheral’, which in

this thesis is based on the notions of opportunity space and path development. So while this thesis tries to contribute to critical thinking about space, there is also a clear economic usefulness to it.

Then there is the academic relevance, which I have shed some light on earlier. First of all, the concept of peripherality is vague. But this isn't the root of the academic problems/relevance. The root is that making spatial categorizations itself (like the notion of peripherality) is difficult and when trying to understand real complexity often not even epistemologically relevant. However, I can see that making some categorization in terms of a spatial 'winners' and 'losers' is useful in trying to fix problems which have to do with social and economic backwardness of people, that is to combat inequality. But from the extensive literature review, this categorization is often based on nothing at all. Mostly purely the geographic definition of peripherality; being far away from some 'core'. Or the structural definition based on some indicators of life-quality. Both these conceptualization don't do justice to the complexity of categorization and the relatedness of space.

This thesis will try to shift these structural conceptualization towards more agency-based approaches, which try to do more justice to the complexity of space and the relatedness of regions. In this way, this thesis will bring to the light which regions really suffer from the geographical inequality of opportunities and future path development, which might be a good indicator for policy interventions.

1.5. Thesis outline

The next chapter presents the theoretical framework of this thesis. Key concepts introduced in the first chapter are elaborated upon, beginning with the notion of peripherality or left-behindness. This is followed by an exploration of how peripherality is conceptualized within the Dutch context. The chapter concludes by establishing the theoretical connection between peripherality and human agency, drawing on the concepts of opportunity space and path development, and the trinity of change agency model.

Building on this theoretical foundation, the third chapter outlines methodological approaches. It explains how the conceptual model is operationalized to bridge theory to empirical analysis. To enhance our understanding of the spatial dynamics underlying regional categorization, the research employs two complementary methods derived from the conceptual model: a structure-based approach and a case study approach focused on human agency.

Chapter four presents the empirical findings from both methods. The structure-based and agency-based analyses are discussed separately but with attention to their interconnections, offering a more comprehensive understanding of 'peripherality'.

Finally, the concluding chapter synthesizes insights from both approaches to offer an integrated understanding of spatial dynamics and regional categorization, followed by a reflection on the theoretical framework, methodologies, results, and interpretations, and proposes directions for future research.

2. Theoretical framework

2.1. The fuzziness of peripherality/'left-behindness'

The term 'periphery' in the Cambridge dictionary is explained as "The outer edge of an area", coming from the Greek word 'peripherēs' which means 'revolving around'. This conceptualization of the term is widely used within policy- and academic environments such as in Geography and Planning to define sparsely populated areas or hinterlands. However this understanding of the periphery has been supplemented by process-centered perspectives deviating from this basic conceptualization of periphery towards more multifaceted definitions (Lang, 2012), key is that peripheries are not given or natural (Armondi, 2022). The concept of the periphery is constantly shifting and now has more of a connotation of 'lacking in quality'. Especially within societal debates 'periphery' has different meanings, which is what this research is all about. A large contributor to this term cannot be overlooked and that is Emanuel Wallerstein who thought of peripheral countries, which are 'on the margins' of the capitalist world system. With this term, Wallerstein wanted to emphasize the structural relatedness of peripheral countries to cores (I. M. Wallerstein, 2004).

Blowers & Leroy (1994) define peripheries as "geographically remote, economically marginal, politically powerless and socially inhomogeneous". Peripheries are often characterized by poor infrastructure (Kesten, 2017), limited availability of social capital (Leibert & Golinski, 2017), high out-migration rates, especially of women (Leibert et al., 2015), institutional thinness (Tödtling & Trippl, 2005), and supposed weak innovation capabilities (Graffenberger et al., 2019). The word periphery is now being used as an adjective, which means that certain 'things' (in this case space) can become peripheral, through the process of peripheralization.

For many scholars, peripheralization describes social relations that have spatial implications, peripheries are essentially produced by various social processes (Oppido et al., 2023). Kühn (2015) states that periphery is a rather static concept but that peripheralization is more dynamic and scalar. This definition of peripheralization is quite close to the geographic understanding of marginalization (Kühn, 2015). In this understanding, centers often produce a Matthew effect (Merton, 1968); they tend to get richer over time, while the peripheries get poorer. As first put forward in this way by Wallerstein's world-systems analysis: "core processes consist of relations that incorporate relatively high wages, advanced technology, and a diversified production mix, whereas peripheral processes involve low wages, more rudimentary technology, and a simple production mix" (Flint & Taylor, 2018). Although world systems analysis operates at the global scale, as opposed to much economic geography literature as well as this thesis that operates on the national, regional or urban scale, the basis is quite the same; the periphery is not static or pre-given but rather the spatial landing of certain economic processes.

The topic of peripherality has been receiving increasing scholarly attention over the past years, especially in the subfield of economic geography after the 2008 financial crisis. Rhianon Pugh made a cornerstone contribution to the theorization of peripherality presenting some problems with the concept that mainly come down to the 'fuzzy' language of and around the term, a focus on negative perception, a lack of inner periphery dynamics research, and a lack of consideration for classed, raced, and gendered dimensions within the periphery (Pugh & Dubois, 2021). Other scholars such as Šimon (2017) note the domination of certain scholarly perspectives. Either the purely geographic notion of the periphery concept focusing on sheer distance and material linkages to the core. In this approach, the core is economically, politically, and culturally upward, mainly due to the processes of capital accumulation, cumulative causation, and agglomeration

effects such as localization and urbanization economies as proposed by (Myrdal, 1957) and new economic geography theory (Krugman, 1991).

Other scholars use more social approaches, defining the periphery mainly as a place or region with lower sociocultural, economic, and political standards. Within these perspectives, certain social transformations land in the periphery, which makes these places considered marginalized or 'peripheralized' (Kühn, 2015). Overall, peripheries are predominantly associated with ideas of shrinking regions experiencing limited access to and diminishing public services, economic marginalization, the out-migration of young and well-educated people, and an aging or marginalized population (Beetz et al., 2008). These views are often linked to the sharp contrast with positive images of core regions (Keim, 2006) which are considered places of creativity and innovation, attracting young and creative entrepreneurs, and accumulating knowledge, jobs, capital, and power (Florida, 2012).

Furthermore, many scholars coming from both spatial sciences and social/political sciences are increasingly using the term 'left behind places' or 'places that don't matter' (Fiorentino et al., 2023), referring to places that are left behind by national politics. These places often have similar characteristics as many definitions of peripherality. That being places of economic deprivation, changing demographics, loss of educated and talented youth, overall outmigration, and economic decline (Etherington et al., 2022). Pike et al. (2024) present a solid etymology of the term and emphasizes the relational, heterogeneous, and multiscalar aspects, of various 'left-behind' conditions. Mentions are made of post-industrial regions/cities like the US Rust Belt, post-industrial cities in the UK (also known as Brexitland), and the German Ruhrgebiet as prime examples. Furthermore, places in the Netherlands are mentioned, such as the 'krimpgebieden' (shrinking areas). MacKinnon et al. (2024) approach left behind places as places of discontent and mentioned post-industrial regions that have shown relative economic underperformance. Rodríguez-Pose (2018) perceives left behindness as lacking in opportunities and links this to political change and the emergence of populism in these regions. Overall much research mentions the lack of opportunities in these left-behind or peripheral regions (Görmar & Lang, 2019; Grillitsch & Sotarauta, 2020; Kurikka & Grillitsch, 2021; Nilsen et al., 2023). Especially since the 2008 economic crisis, both academic studies and political discourses have seen growing concerns about geographically unbalanced development and hence peripheries, which have become conceptualized and labelled as 'left behind places' (Martin et al., 2021) (Velthuis et al., 2023).

Görmar et al. (2023) mention that 'left-behindness' is a result of peripheralization. While previous conceptualizations of left-behind places and peripheries focussed on geographical remoteness, they think the term is also applicable to regions less geographically distant from centers, thus emphasizing the multiscalar nature of the term. According to Leibert & Golinski (2017), peripheralization operates through four key mechanisms: out-migration, usually of the younger, and better-educated sections of the population; disconnection from infrastructure and knowledge networks, dependence on larger cities for the provision of services; and, discursive marginalization or stigmatization through the creation of negative regional images and perceptions. Peripheralization is a relational and multi-scalar process that connects the growth and decline of different geographic scales (Leibert & Golinski, 2017). In addition to being regions experiencing decline or stagnation on economic, demographic, and social dimensions, ranging from deindustrialized cities to more rural regions, left-behind places are also understood as places of political discontent (De Ruyter et al., 2021; MacKinnon et al., 2021; Rodríguez-Pose et al., 2023; Urso et al., 2023).

What becomes clear is that periphery, left-behind places, and peripheralization are closely linked through all sorts of processes that are generally not present in 'cores', urban areas, or economically well-performing regions. For the rest of this thesis, it might be useful to use one term that covers all these terms describing these marginalized places. Let's use 'periphery'. Authors seem to be critical of the structural conceptions of peripherality and note the heterogeneity and multiscalar nature of these concepts. They emphasize the relatedness and the processes creating peripheries, and the need to move beyond structuralist conceptions towards more human agency based approaches. However, they don't provide solid tools for better understanding periphery. One important characteristic is the lack of opportunities and the role of human agency within peripheries. Innovation and knowledge of actors within peripheries is often devalued due to an overemphasis on structure which the mainstream literature has been criticized for (Bristow & and Healy, 2014; Uyarra et al., 2017). Precisely this is what I want to continue on in conceptualizing periphery. Using human agency approaches.

2.2. Peripherality in the Netherlands

In this research, the link between the above-discussed theory must be made to the Netherlands. Some scholars and governments research already looks into these topics concerning the core-periphery divide and its effects on polarisation such as 'Atlas van afgehaakt Nederland (de Voogd & Cuperus, 2021), 'het ongelijkheidsdebat tussen stad en land' (De Voogd, 2015), 'de emancipatie van de periferie' (Alkemade, 2016), 'Politieke polarisatie in Nederland' (Dekker, 2022) and 'regionaal maatschappelijk onbehagen' (van den Berg & Kok, 2021). However, these works often lack a critical understanding of peripherality and its complex heterogeneity. Many conceptualizations come down to sheer distance to a pre-defined core, often intertwining the use of the urban-rural divide with other conceptualizations of the core-periphery divide without a critical understanding of both terms and their differences (de Lange et al., 2023; van Vulpen et al., 2024). There also seems to be a stigmatizing way of thinking about peripheries using stereotypes as shown by Pinget & Voeten (2023) where they looked at the role of dialects in the Netherlands as a way of conceptualizing cultural peripheries and how people within these regions are often stigmatized because of this. Furthermore, there is wide use of structural variables indicating some kind of lack of 'well-being'. These variables might indicate a sense of 'peripherality' however these approaches don't provide a deeper understanding of what leads to this lack of well-being and what it means to be 'peripheral'. These approaches still view 'periphery' as solely a category based on structural indicators instead of making attempts to understand the regional complexity and the relatedness of space.

A relevant piece of literature comes from Twan Huisman (2024). His research looks at urban-rural political divergence in the Netherlands and how place affects political attitudes. This study states there is a growing divergence between cities and the countryside and that economic factors related to globalization and the agglomeration effects of cities (cores) this divergence fuels. Furthermore, people coming from the countryside often have a strong cultural identity which politicians tap into, creating a geographic political polarisation. Thus cultural identity is strongly linked to the political part of geographical polarization. But as Twan mentions, the divergent classes; the urban and the rural strengthen the division, which can be seen as the peripheralization of the countryside.

This study shows the strong interconnectedness between economic processes and the categorization of space, specified to the urban and the rural in the Netherlands; which can be seen in the broader theorization of peripherality as core and periphery. Subsequently, Twan looks at the core-periphery divide, which is operationalized through the Randstad (core) and the non-

Randstad (periphery). This operationalization of core and periphery is not very well conceptualized and focuses solely on geography as an indicator of peripherality or 'left-behindness'. Perhaps, it misses the point of what peripherality is from the perspective of peripheries literature which comes down to less economic strength and resilience, and a lack of opportunities in relation to 'cores' and.

This is where the role of human agency and opportunity space come into play. Because while much research is quite extensive on which divides or polarising tendencies there are between the pre-defined cores and peripheries or between the urban and the rural, a good understanding of inner periphery dynamics is missing (Görmar & Lang, 2019). The notion of human agency brings a new dimension to this debate, which looks specifically at the periphery and its heterogeneity as opposed to the many conceptualizations of the periphery based on the sheer distance to a pre-defined core or other structural preconditions. It is the result of human actions that knowledge networks and material relations are produced, leading to opportunities for regions to escape the common categorization of periphery. The ability to create opportunity is thus closely linked to peripheral processes and humans create these opportunities (Bosák et al., 2024). In the rest of this theoretical framework, I will explain human agency within the context of regional development and how human agency can create opportunities for regions to escape the categorization of peripherality.

2.3. The role of human agency and opportunity space

The importance of human agency and opportunity space within this research is constituted through the notion of path development based on the practical definition from (Martin & Sunley, 2006), which is also used in much newer economic geography literature focussing on agency and path development. This definition comes down to "the evolution of different (industrial) development paths and innovative activities that push regional or industrial actors and institutions in one direction or another" (Martin & Sunley, 2006). New path developments are thus made by actors through new economic activities, based on knowledge. In this approach, the power of a region in economic terms roughly comes down to the ability to produce strong (industrial) path developments to attract further economic growth; a process which is often described as cumulative causation. On the other hand, regions should also be able to shift from one development path to another in case of economic underdevelopment by a certain path; they need to be resilient.

Naturally, the decisions that these actors make are constituted by various structural preconditions, such as available resources. However, these preconditions vary greatly. Therefore analysis based only on these structural preconditions doesn't do justice to the heterogeneity of the many regions that are being analysed in this research. Therefore a shift in focus to more agency-based dynamics is necessary. This agency-based approach aligns with more recent economic Geography literature concerning the question "Why do some regions grow more (or less) than others with similar structural preconditions?" (Rodríguez-Pose, 2013).

The next step is how to work with this agency-based approach. The cornerstone in defining human agency is based on the Dictionary of Human Geography's definition; "The ability of people to act, usually regarded as emerging from consciously held intentions, and as resulting in observable effects in the human world" (Gregory et al., 2011). (Grillitsch & Sotarauta, 2020) have made a valuable contribution to conceptualizing agency within regional studies. They use what they call 'the trinity of change agency model' consisting of three different kinds of actors that transform the spatial-economic structure of regions: innovative (Schumpeterian) entrepreneurs, institutional

entrepreneurs and place-based leaders. The first is a crucial starter of transformations because they are a source for path-breaking innovations, setting-off new industrial specializations and the transformation of places; diversifying path developments. The second agent, institutional entrepreneurs, see opportunities to bring along change and take the necessary risk to make that happen strengthening path developments. The third agent, place-based leaders have even more assets and with this, they try to coordinate innovative and institutional entrepreneurs by pooling competencies and resources to benefit the individual agent as well as the broader region.

(Grillitsch & Sotarauta, 2020) continue how these different actors create so-called opportunity spaces for spatial-economic transformations, together with time, region, and actor-specific conditions. In these opportunity spaces agents reflect on their actions considering how structures may change in the future and thus alter their agency in relation to structures. They explain opportunity space in the article as 'the time or set of circumstances that make a change possible' (Grillitsch & Sotarauta, 2020, p. 713) They further explain how regional preconditions are still important as they shape the experiences of agents, and thus have effect on the opportunities for spatial-economic transformations. With this in mind, it is the notion of opportunity space that establishes the most direct link between structure and agency that will be used in this research. For a better understanding of the trinity of change agency (the three mentioned agents) and opportunity spaces, which form the theoretical basis for the operationalization of human agency in this research, please see (Grillitsch & Sotarauta, 2020). (Kurikka & Grillitsch, 2021) continue on this model and show how this explains 'peripheral' differences between regions.

Continuing in this alley of research (Nilsen et al., 2023) try to take this approach to human agency into conceptualizing peripherality. Also using the trinity of change agency model and the notion of opportunity space, Nilsen et al. look into how agency, as proposed by (Grillitsch & Sotarauta, 2020), can influence regional development in peripheral regions. They come up with an improved understanding of regional preconditions that are important for the emergence of human agency and thus opportunity; differentiation of the actor composition and skewness of power relations. These two regional preconditions essentially build on Grillitsch & Sotarauta's work on human agency in regions and their notion of opportunity spaces.

A high differentiation of the actor composition allows for agency to be widely distributed between individual actors, knowledge networks, and institutionalized relations which give access to e.g. human and financial resources. In cities for example, the differentiation of the actor composition is high, which leads to new development paths and innovation. In the context of Nilsen et al.'s research, a high variety of businesses, universities, public administration, and civil society is important for a high differentiation of the actor composition, which leads to better opportunity spaces in which the three proposed actors by Grillitsch & Sotarauta can operate more innovatively. A low differentiation of the actor composition tends to produce a higher vulnerability because people must move elsewhere for education and job opportunities, leading to depopulation and making it increasingly difficult to provide public services and related functions, developments associated with 'peripherality'.

The other regional precondition; skewness of power relations is based on the notion of Human agency described as a power relation so far as it is only through actions that structures (or path developments), are reproduced or transformed. Actors, depending on their knowledge, positions in networks, and institutionalization of relations, vary in their possibilities to exercise power. A high skewness essentially means that power is unequally distributed among human actors. It is a measure for the degree for whether power is concentrated in dominant firms or sectors. A high skewness of power relations is the key reason for dominating actors within lower developed

regions such as monopolizing firms dominating the labor market or regional dependency on a narrow specialization. As shown by (Görmar et al., 2023) local agency is significantly constrained when power dynamics are heavily imbalanced due to the dominance of single actors with non-local ownership, making it difficult for regions to diversify. In these cases, agency isn't able to flourish between businesses, firms, organizations and sectors, and hinders actors from creating opportunities. Regions might have a strong monopolizing firm (a strong path development) but are very vulnerable to changing markets, as happened for example in 2008. This might lead to former strong regions becoming peripheral, such as post-industrial regions, this phenomenon is more commonly known in Economic geography as path dependency (Hassink, 2017).

Nilsen et al. present a further developed contextualization of 'peripherality' based on human agency and opportunity space, which considers the heterogeneity of regions. They come up with different typologies of peripherality based on the above-discussed regional preconditions. That is precisely not what this study aims to do since the objective is not to create new categorizations. Rather, with this theoretical framework, a better understanding of what it means to be peripheral can be made in the Netherlands. Another advantage of these regional preconditions is that they are measurable in the Dutch regional context, more on that in the methods paragraph. This kind of approach locates agency not in the attributes of individual agents but in the relationships connecting agents to structures in opportunity spaces, which is a very adequate operationalization to shift conceptualization of peripherality towards more human-agency based, whilst still maintaining a general overview.

2.4. Building a conceptual model

In light of the literature examined it is evident that the 'periphery' categorization is the outcome of a combination of geographic factors, historical (social) structures, and choices made by individuals. This comes down in the below shown conceptual model. This model portrays the various ways of conceptualizing peripherality from the theoretical review. The left side of the model portrays how human agency contributes to conceptualizing peripherality. That is through the notion of opportunity space and path development that regions are analyzed. As mentioned two measurable regional conditions measure this way of analysis; differentiation of actors and skewness of power relations.

The right side of the model portrays social structure-based approaches to conceptualizing peripherality. These are the variables that indicate 'peripherality' or 'left-behindness' which are prevalent in much present-day literature. These indicators show certain marginalizing aspects of regions. As I will explain in the following chapter, this side of the model will work as an analytical starting point against which the human-agency-analysis is compared to look more closely at the regional complexity. This structural part of conceptualizing peripheries can be seen as a more deductive way of analyzing regions, where conclusions are drawn from general structures in the form of measurable indicators. What will show is that this approach on which most contemporary conceptualizations of 'periphery' are made, fails to adequately represent regions. The human agency analysis builds upon this but gives a more inductive insight into regions based on region-specific conditions, showing its importance as an important addition to the structural conceptualization.

The last dimension, on the bottom of the conceptual model, is the geographic dimension. That is pure distance to a pre-defined core. I made it grey on purpose because this is exactly not what I want to take into this research. However since much present day literature uses this conceptualization I wanted to take it into account, also to compare the other two dimensions to.

In the following chapter I will operationalize this conceptual model to eventually measure these dimensions and put them into analysis. With this more agency-incorporated model, a better understanding of what it means to be peripheral can be made. This will also grant us to be more critical of the loose categorization of 'periphery'.

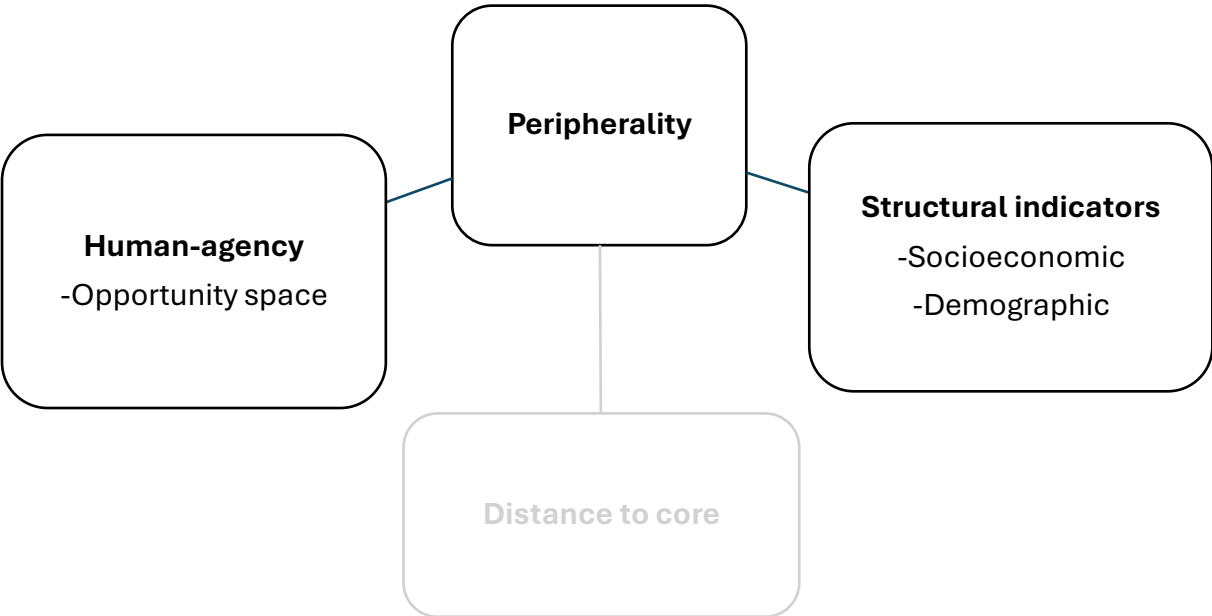


Figure 1 Conceptual model, understanding peripherality

3. Methodology

This research aims to use the previously shown conceptual model to get a better understanding of the multifaceted conceptualizations of peripherality in the Netherlands. The main goal following the research question is to investigate how human agency can contribute to this understanding using the region-based human agency framework proposed by Nilsen et al. (2023) and Grillitsch & Sotarauta's (2020) notion of opportunity space. The left side of the conceptual model covers this goal. To get to a better understanding of peripherality in the Netherlands using human agency, the first step would be to create some form of an indication of regions that are score lower on indicators associated with 'peripherality'. That is to make the structure-based approach of conceptualizing peripherality based on indicators I mentioned earlier. With this structure-based approach, a general overview is created that shows how regions score based on indicators that relate to peripherality. This serves as a first inquiry into the regional dynamic that is key to the categorization into peripheries and paves the way for the agency-based approach to follow on this.

Although agents structure the social world and thus contribute in their way to the variables indicating peripherality, relating these social structures to broader theorizations of agency is out of the scope of this research and will have no use in analyzing the role of human agency through the notions of opportunity space and path development. Hence I chose variables that have a strong theoretical foundation within peripheries research, and which are also applicable and measurable in Gelderland. As mentioned earlier, there is a clear relationship between economic processes and the categorization of regions into peripheries (Huisman, 2024), as these regions are often considered economically backward and perhaps the 'underdogs' of the contemporary capitalist system (Peck et al., 2023). (Kühn, 2015) provides a holistic overview of theoretical concepts relating to peripherality, often relating to economic and demographic factors. Economic marginalization, out-migration of young, well-educated people, and an aging or marginalized population among others are much-used indicators (Beetz et al., 2008; Leibert & Golinski, 2017). These variables are divided into socioeconomic- and demographic indicators (Kühn & Bernt, 2013). Indicators of peripherality with a strong theoretical foundation in the demographic axis are net migration, population age, and dependency rate ('grijze druk' in Dutch).

Furthermore, I interviewed Dominique Brinkhorst, she is strategic advisor monitoring and evaluation at the Province of Gelderland and former project leader regional economy. This interview had some valuable insights, especially the importance of more inductive ways of looking at the regional economy and spatial categorization such as human agency-based approaches, on which more in the results chapter. For the methods parts of this thesis in relation to the structural variable is the main takeaway the importance of economic indicators such as number of businesses, number of jobs, unemployment, GDP, and income, which I will take later on in the structural analysis. Altogether these variables will contribute to an index of 'peripherality'. Thereafter, a GIS analysis will spatially compute this data, using color grades to indicate the 'peripherality' of each municipality based on these variables. It is important to note that precisely this structure-dominated approach of conceptualizing periphery is what this thesis critiques. However, to gain a meaningful understanding of peripherality through the lens of human agency, it is essential to begin with a baseline structural overview. This general analysis serves as a reference point against which the human agency approach can be compared. In doing so, the added value of incorporating human agency becomes clearer, as it reveals dynamics and complexities that structural indicators alone may overlook.

The third axis is sheer distance to a pre-defined core. I won't take this variable into the quantitative analysis because virtually all present-day Dutch literature on this topic already considers this quite extensively. Furthermore, defining a certain core is difficult in itself, which requires a whole new inquiry which this thesis does not have space for. However, since this is a conceptualization of peripherality that is used frequently both in societal as in academic discussions, it must be taken into account. Hence I will use the analyses based on human agency and social structures and compare them to present-day conceptualizations of peripherality based on distance to a pre-defined core in Dutch regional literature. Most Dutch literature about peripheries posits the 'Randstad' as a core, and the rest of the country as 'peripheral'. As basic as it is, this will be the operationalization of this distance-based dimension of conceptualizing peripherality.

3.1. Research context and positionality

This research aims is to better understand peripherality in the Netherlands related to the geographic polarization as a supposed result of the spatial categorization of core and periphery. However, to operationalize this model, the Netherlands as a whole would be out of scope. Not every part of the Netherlands has the same available data, so comparing regions would be difficult. Furthermore, the case-study approach on human agency would be difficult to execute on the scale of the Netherlands because it requires some level of inductive, place-based research. For this reason, the choice was made to focus the analysis on the Dutch province of Gelderland. Gelderland is the largest province, situated centrally in the Netherlands, bordering the provinces of Utrecht, Brabant, Flevoland, and Overijssel, and Germany. mainly due to its size and central position in the country Home to the national park 'Veluwe' situated central in the province, and two main rivers flowing east to west (Rhine) and south to north (Ijssel), Gelderland is quite geographically variegated (Provincie Gelderland, 2025). A lot of space is covered by agriculture, just like the rest of the Netherlands. The three biggest cities are consequently Nijmegen, Apeldoorn, and Arnhem (capital of Gelderland).

The province of Gelderland has a very useful databank consisting of the variables that I want to take into the analysis such as demographics, economics, and migration data. Also for the case-study approach on human agency, the database has a very useful property; there is data available about the differentiation and skewness of sectors, firms, businesses, and organizations. This will be the main input for the analysis. Lastly, a note on the author's positionality. This research focuses on regions that are often perceived as lacking or even stigmatized, perceptions that can, extend to the people living in these areas. Such generalizations risk reinforcing harmful narratives and overlooking local diversity, resilience, and agency. As a researcher from Nijmegen, the largest city in Gelderland, I recognize the relative privilege that comes with my urban background. While I have not personally experienced the stigmatization associated with so-called *peripheral* regions, I have aimed to approach this topic with reflexivity and sensitivity. Throughout this project, I have been mindful of the risk of reinforcing simplistic spatial binaries and have tried to remain attentive to the lived experiences and perspectives within these regions.

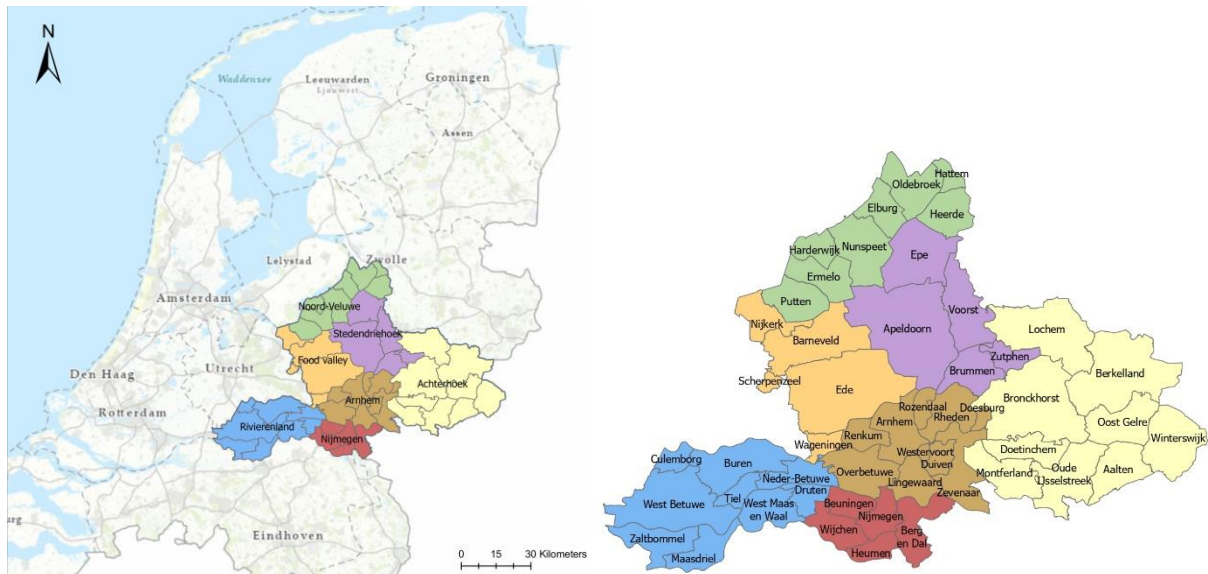


Figure 2 Gelderland situated in the Netherlands (regions and municipalities)

3.2. Operationalizing dimensions

In this paragraph, the dimensions for understanding peripherality as shown by the conceptual model are operationalized to make the link between theory and empirics. From the conceptual model shown earlier as a starting point, the thesis now diverges in two different ways of understanding peripherality. Firstly via the analysis of structural indicators as operationalized through measurable variables indicating peripherality. This presents a general overview of peripherality in the Dutch province of Gelderland and serves as a backdrop to better direct, and compare the human-agency approach. The second way of understanding peripherality is through human agency theorized through the notions of opportunity space and path development and operationalized in the regional pre-conditions of differentiation of the actor composition and skewness of power relations among actors. In this paragraph it will become clear what these two different ways of conceptualizing peripherality entail, to measure them in the Dutch province of Gelderland.

3.2.1. Structural indicators

The Structural axes that are being used in this research are as mentioned earlier socioeconomic and demographic. These axes were found based on much present-day regional- and peripheries-research, but also on Dutch research into regions and polarization and the interview with former project leader regional economy at the province of Gelderland, Dominique Binkhorst. Cultural identity within regions plays a big role in political polarization and thus is important to consider, however since it are the often mentioned socioeconomic and demographic processes that shape the categorization of peripherality, the axis of culture is not considered. That is not to say that peripheries don't have culture or that it doesn't play a role, but rather that it loses relevance within the framework of this study, which is more materially based. Furthermore, the axis of politics is also not considered. Not because it is not present in the contemporary conceptualization of peripherality, quite on the contrary. However, defining this axis has proven notably difficult, especially since the societal aim of this research is to come up with an understanding of peripherality concerning polarizing political tendencies. Hence it is left out, with the note that this political axis is rather relevant, but another research on its own. See for example (Huisman, 2024).

The socioeconomic axis mainly consists of indicators that are operationable within the regional context of this research also considering the availability of useful data. Without losing sight of the theoretical foundations of this axis, the following indicators are used: (1) number of businesses, (2) number of jobs, (3) GDP, (4) level of unemployment, and (5) disposable income. The axis of demography consists of the indicators (1) share of population under 25, (2) net migration, and (3) dependency ratio. These indicators are chosen based on theoretical insights in peripheries research, Dutch-based research, and workable data, primarily from the Central Statistics Office of the Netherlands (CBS) and the statistical database of Gelderland (statistisch zakboek gelderland). The abovementioned axes and indicators give a structural picture of peripherality in Gelderland, which serves as a general overview to subsequently analyze the role of human agency in understanding peripherality. The following table shows the operationalization of this way of understanding peripherality as well as the other dimensions of human agency and geography.

Dimension	Axis	Indicator	Source/measuring tool
Structure	Socio-economic	Number of businesses	Statistical data base
		GDP	Statistical data base
		Unemployment	Statistical data base
		Number of jobs	Statistical data base
		Average disposable income	Statistical data base
	Demographic	Share of inhabitants below the age of 25	Statistical data base
		Dependency ratio	Statistical data base
		Netto-migration	Statistical data base
Human Agency/opportunity space	Differentiation of the actor composition	Differentiation of sectors	Statistical data base, Interview and municipality data
		Differentiation of organizations within sectors	Statistical data base, Interview and municipality data
		Differentiation of organizations across sectors	Statistical data base, Interview and municipality data
		Distribution of sectors	Statistical data base, Interview and municipality data
		Distribution of organizations within sectors	Statistical data base, Interview and municipality data
		Distribution of organizations across sectors	Statistical data base, Interview and municipality data
Geography	Distance to core	n.a.	n.a.

Table 1 Operationalization table

3.2.2. Human agency and opportunity space

Human agency is more tricky to operationalize because it is difficult to measure the actions that humans take to shape regions. For that reason, the region-based human agency framework proposed by (Nilsen et al., 2023) and (Grillitsch & Sotarauta, 2020)'s notion of opportunity space is used, as a way to make human agency measurable in the regional context of this study. In this way human agency is not located in the attributes of individual agents but in the relationships connecting agents to structures in opportunity spaces, granting a degree of generalization.

Differentiation of the actor composition is measured by the variety of sectors, organizations, and firms. The development of new economic pathways involves more than just the efforts of individual firms (firm-level actors). Broader regional factors, shaped by institutions like local governments, universities, public agencies, and civil society, also play a crucial role in enabling innovation and growth (system-level actors) (Isaksen & Trippel, 2017). Hence, they both need to be incorporated into the analysis. As mentioned in the theoretical framework, a high differentiation may lead to better opportunity spaces, which is a breeding ground for the three earlier-mentioned agents to transform a region. In this way, agency is able to flourish. That is for it to be widely distributed and that structures are available for agents to act upon, changing future regional developments (Nilsen et al., 2023). This conceptualization of peripherality shows the dynamic that is being peripheral. And the fact that peripheries can change and even become core-like.

The skewness of power relations in a region is assessed by examining whether certain sectors or organizations—such as dominant firms, government bodies, or universities—hold a disproportionate influence over regional development. When a single actor or a small group of actors dominates the local economy or decision-making processes, this can lead to path

dependency: a situation in which the region continues along an established development trajectory, limiting room for change or innovation (Grabher, 1993b). Such dominance can restrict the emergence of diverse *opportunity spaces*, which are essential for new economic paths to develop. In this way, a high concentration of power is often negatively associated with regional transformation driven by human agency (Görmar et al., 2023). The difference between the regional pre-conditions is slight. Where differentiation of the actor composition looks at the variety of firm- and system-level actors, skewness of power relations looks at their distribution and searches for possible imbalances within a region

Combining the two regional pre-conditions for human agency gives us four typologies of peripherality based on human agency; (1) highly differentiated and balanced regions, (2) highly differentiated and unbalanced regions, (3) low differentiated balanced regions, and (4) low differentiated unbalanced regions. Nilsen et al use these typologies and discuss the characteristics of these types of ‘peripheries’. They aim to come up with ways of disentangling basic notions of peripherality as homogenous and ‘lacking’, and try to systemize regions’ challenges and opportunities and link them to human agency – essentially what this thesis also does. However by providing this new form of categorization, although in better thought through categories, there is still the problem of categorizing and perhaps creating new stereotypes based on these new categories. For this reason as well as the reason that this fourfold categorization does not work in the a densely populated country as the Netherlands, this research won’t continue on these categories, but rather use this approach to better understand peripheries. Nilsen et All.’s approach using regional pre-conditions for human agency is operationalised in a quantitative matter suited for a case-study approach at this geographic scale.

3.3. Analytical strategies

This research uses two quite different analytical strategies. The first is the structural indicator-based approach, which uses quantitatively measurable variables. The other uses the concept of human agency operationalized through the notions of opportunity space and path development, which is then made measurable through regional conditions that foster human agency and opportunity space, and thus path development. This paragraph gives an overview of the analytical strategies used to analyze both these understandings of peripherality. In this way, this paragraph is the foundation for the results chapter that follows.

3.3.1. Statistical analysis of structural indicators

The analysis of structural indicators uses the previously mentioned variables. For each variable, data was found in the statistical database of the province of Gelderland. The variables can be divided into two categories; numerical values and percentual values. The following table shows the two categories.

Numerical variables	Percentual variables
Number of businesses	Unemployment
Surplus value/regional GDP	Share of inhabitants below the age of 25
Number of jobs	Dependency ratio (<i>grijze druk</i>)
Net migration	
Disposable income	

Table 2 Variables divided into numerical and percentual

Creating a ‘peripherality’ index

To compare these variables to each other and combine them in one ‘peripherality’ index, they first need to be assessed for model assumptions. First of all, the whole population for these variables is available so there is no need to work with samples. This makes the analysis a lot easier since

there are no predictions being made. Thus, no statistical model is necessary. Mentioning any form of model significance naturally has no use. The variables are independent, meaning that they all measure different concepts. As will become clear later; some variables correlate with each other for which a factor analysis will be performed.

To compare the variables, they first need to be standardized relative to the number of inhabitants of each municipality, otherwise the larger municipalities would score higher. Then they need to be standardized to compare them to each other, I use the Z-value normalization, which transforms the data so that the mean is zero with a standard deviation of one. This method is useful later on in the factor analysis and makes outliers better visible. To compute a variable into Z-values, the residuals need to be normally distributed, which is the case for all variables except for disposable income with one very strong outlier; the municipality of Rozendaal (which is known for its rather rich segment of the population). For this reason, the variable of disposable income is only used in the first analysis which is solely based on these eight variables, all with a weight of 1. Not in the eventual peripherality index, which will be based on principal components following the factor analysis.

Next up, all variables seem to be homoscedastic relative to the made-up dependent variable of 'peripherality' (see annex) except for disposable income, net migration, and unemployment. This isn't particularly a problem since there won't be any linear regression modelling but it might mean that there needs to be careful consideration of these variables in the eventual analysis. Furthermore, for the factor analysis that will be performed later, it is of greater importance to have homoscedastic residuals. Because disposable income and net migration stand out on this assumption, they are left out of the factor analysis. But more on that later.

Since the percentual variables are already relative to the municipalities' number of inhabitants, only the numerical values need to be standardized relative to inhabitants. The following formula is used to standardize these values to each municipalities number of inhabitants:

$$x'_{i,j} = \frac{x_{i,j}}{p_i} \times 100.000$$

The above formula makes the numerical variables related to their municipalities' number of inhabitants. $x_{i,j}$ is the numerical value of each variable (j) in municipality (i). p_i is the number of inhabitants of the municipality (i). Finally, $x'_{i,j}$ is the standardized value relative to 100.000 inhabitants. Note that this computation is not necessary for the percentual variables since they are already standardized relative to the number of inhabitants.

$$z_{i,j} = \frac{x'_{i,j} - \mu_j}{\sigma_j}$$

Next up, all variables, also the percentual ones, have to be computed into Z-values to relate them to each other and to eliminate spread. This is done with the above formula, where all standardized values related to their municipalities' inhabitants times 100.000 are subtracted by their mean, divided by their standard deviation. This results in standardized values, which are comparable to each other.

$$Z_i = \sum_{j=1}^8 z_{i,j}$$

Finally, all variables are summed up to create one standardized value of ‘peripherality’ based on numerical and percentual values. This is what the above formula does. These values can be attributed to each municipality in Gelderland, which is made visible using ArcGIS in the next chapter.

Lastly, To identify spatial patterns in the distribution of both the variables as well as the peripherality index (Z_i), the Global Moran’s I statistic is used. Moran’s I measures spatial autocorrelation by evaluating whether values observed in neighboring municipalities are more similar than would be expected under spatial randomness. The analysis will be carried out using the Spatial Autocorrelation (Global Moran’s I) tool in ArcGIS Pro. The resulting Moran’s I value provides insight into the extent of clustering: values close to +1 indicate high similarity among neighboring areas, values around 0 suggest no spatial pattern, and values near –1 indicate a checkerboard-like pattern with high-low alternation. This method is interesting to use in understanding peripherality since it shows spatial relatedness and neighbor effects. Clusters of ‘peripherality’ are made visible which might show some overarching structural constraints for these regions. Lastly, in much present-day research, the entire region of the ‘Achterhoek’ is seen as peripheral. Using spatial autocorrelation will determine whether this really is a clustering.

Factor analysis; fitting variables into principle components

As mentioned before there are some issues with the data that need to be overcome. Most importantly, there are correlating variables. This isn’t odd because these variables all point in the same direction of ‘peripherality’. However, this might mean that there are some variables that are better combined into new components, or factors. Rather than keeping them isolated. Hence, a factor analysis is computed to look for strongly correlating variables and to fit them into factors.

An important assumption to make an adequate factor analysis is that the variables need to be homoscedastic. This is the case for all of them except for disposable income, net migrations, and level of unemployment. Especially disposable income and net migration stand out. Hence, these variables will be left out of consideration in the factor analysis. However, since net migration has a very strong theoretical ground for indicating ‘peripherality’ it will still be used in the peripherality index. Finally, the unemployment variable shows a bit of heteroscedasticity. I left this variable in the factor analysis to see what comes out, which is discussed below.

In SPSS the variables are analysed in a covariance matrix, indicating that there is covariance between some variables. Then an analysis of the eigenvalues of the variables is executed, which indicates that three notable factors explain a lot of the spread. They have an eigenvalue above 1. That means that there are three factors contributing to what is considered ‘peripheral’ based on these 7 variables. Next up, a factor analysis is computed using a varimax rotation, so that the variables contributing to the factor stand out more.

From this factor analysis, three underlying components with correlating variables came out. The first component is based on the demographic indicators; share of the population below 25, and dependency ratio. The next component is related to economic output with the correlating variables of surplus value and number of jobs. The third component is based on the variables ‘number of businesses’ and ‘unemployment level’. Interestingly ‘level’ of unemployment is quite

strongly correlated with number of businesses, which sounds logical. It showed up in the factor analysis as contributing to a component, so I chose to incorporate this variable. It is a bit harder to find an overarching dimension for this component but it seems that this component relates to living environment/economy.

Noteworthy is that net migration is not fitted into a new component based on the factor analysis. This is expected since this variable was very strongly heteroscedastic. This means that it doesn't particularly correlate with other variables. But since net migration is a very important indicator of peripherality based on literature. I chose to give all three components and net migration a weight of 1. Making four contributing variables shown in the below table.

Variable/component	weight
Demographic	1
Economic power	1
Economy/living environment	1
Net migration	1

Table 3 Components used for conceptualizing peripherality

Note on variables, scale, temporal dimension, and policy perspective

It should be clear that using these variables is just a perspective on what 'peripherality' is. There are probably more variables contributing to a structure-based conceptualization of 'peripherality' but they are purposely left out of this analysis. The variables used have a strong theoretical foundation and are now factored into new components with a weight of one. The interview with Dominique Brinkhors (former project leader regional economy at the province of Gelderland) as well as an extensive literature review showed economic components to be important in the categorization of peripherality, hence the decision to incorporate two components of the economy with both a weight of 1.

The next point worth making before the analysis is the role of geographic scale. The peripherality index as discussed in this paragraph is based on the municipality scale because these are interesting to measure and compare to each other whilst presenting a good level of detail to show the different levels of 'peripherality' in Gelderland. Using the municipalities scale lends itself to look for cross-border relationships between municipalities. In this way, the spatial-economic structure of the overarching regions, as laid out in the earlier shown map of Gelderland, is best understood. Lastly, looking at firm- and system-level diversification and skewness is best done using smaller scales because the inner regional dynamics are often too complex when looking at larger units of geographic scale such as COROP- or WGR-regions (Dijk & Broersma, 2002).

Then, the temporal dimension. Because peripherality is dynamic because it has much to do with economic development and stagnation, which are concepts with a temporal dimension, it is important to know how these regions change over time based on these variables. It is important to emphasize that this analysis is done with data mostly coming from the year 2023. A check on temporal changes in these regions was performed and what shows is that the absolute values change but the relative values stay very similar. So while this analysis is a snapshot of 2023, the relative values of these variables stay very similar. This might hint at some form of a structural core-periphery dynamic in these regions. This is also not striking since core and peripheral regions often have some sort of a Matthew effect; the strong get stronger while the weak stay weak or even get weaker (Merton, 1968). However, more inquiry into the temporal dimension of peripherality could be interesting for future studies.

Lastly, the interview with Dominique was considerably valuable and gave some strong insight for this thesis. Especially the importance of the more case-study-based approaches in regional

economic studies, which the human-agency analysis will build upon. Dominique also mentioned a clear division between cores and peripheries, which she noted as ‘koplopers vs achterlopers’ (leaders vs laggards). She also mentioned the importance of governmental ‘bordering’. That is the conscious incorporation or exclusion of regions into broader governmental bodies. This might lead to the peripheralization of certain regions. To understand Dominique’s perspective better in a geographic sense, I asked her to draw the core-periphery dynamic on a map (see annex). This, along with other insights from the interview will be discussed in the results chapter.

3.3.2. Case-study analysis of human-agentic conditions and opportunity space

How human agency operates to create opportunity spaces, which again creates stronger and more diversified path developments is difficult to measure. In the first instance, this would require a more place-based qualitative approach. However, this research aims to shift conceptualizations of peripherality towards human agency approaches, and not to completely provide a new human-agency-based approach built from the ground up. To make this dimension of peripherality measurable, the region-based human-agency framework provided by Grilitts en Saturauta is used. In this framework three distinct agents create so-called opportunity spaces, which are the foundation of future path developments and path diversification; elements vital for strong economic regions.

The agents as proposed by Grilitts and Saturauta; being innovative (Schumpeterian) entrepreneurs, institutional entrepreneurs, and place-based leaders, use regional knowledge networks and material linkages to create initiatives and opportunities. In some sense, they tap into former structures in order to initiate change (Grillitsch & Sotarauta, 2020). In shifting conceptualizations of peripherality from structural to more agency-based approaches, the first step is to look at measurable conditions that stimulate human agency to flourish between the three proposed agents to create opportunity spaces. This is the regional basis on which opportunity spaces are created. Indicators for this with a strong theoretical foundation are differentiation of the actor composition and skewness of power relations between actors (Nilsen et al., 2023). These conditions will be measured by looking at the differentiation and variety of businesses and organizations and how these are differentiated and varied across and within sectors.

A high differentiation means that actors are differentiated in and between sectors, which stimulates agency to be widely distributed. In such differentiated regional economies, organizations and individuals are embedded in a wide array of institutional, material, and knowledge-based linkages. Regions characterized by a historically evolved diversity and differentiation of firms, sectors, and institutional actors – such as large metropolitan areas – tend to be more resilient. These urban regions often provide a fertile ground for new path creation, as actors can recombine existing capabilities and resources to respond to changing economic conditions and explore new development trajectories (Simmie & Martin, 2010).

Skewed power relations among actors often means that activity is concentrated in just a few sectors, firms, or institutions. In such contexts, dominant actors can limit the space for others to experiment, collaborate, or take initiative. As a result, the distribution of agency across the region becomes uneven, which can hinder the emergence of new opportunities and alternative development paths (Grabher, 1993b). A well-known example is the decline of many Rust Belt cities, or the Ruhrgebiet in Germany, where strong dependence on a handful of large industrial firms made local economies vulnerable (Grabher, 1993a). When global markets shifted and these firms lost competitiveness, there were few alternative sectors or networks to absorb the shock,

leading to job losses and long-term socio-economic decline. This highlights the importance of economic diversification. Regions with a broader mix of sectors, organizations, and institutional linkages are generally more resilient because they can adapt more easily to change, create new economic path development, and prevent regional-economic 'lock-ins' (Hassink, 2017). That said, strong development trajectories still play a vital role in the performance and liveability of regions. Cities like Eindhoven, for example, initially grew around a dominant firm (Philips), but later managed to diversify through the emergence of new actors like ASML and a wider tech ecosystem. Even regional lock-ins can be positive if a firm or sector is growing and provides new jobs and innovation (Martin & Sunley, 2006). Perhaps the key is balance: having strong sectors is valuable, but long-term resilience depends on ensuring that agency and resources are not overly concentrated. Regions that enable a more distributed and open structure of relations between actors are better positioned to navigate future transitions. More interpretations on these topics will follow in the results section.

This approach will provide the basis for analyzing the possibility for human agency to flourish and create opportunity spaces in regions, which is an indicator of strong economic development and path diversification. However, there are more aspects that indicate that human agency can create new opportunities. For example, better infrastructure may lead to agency being better geographically distributed, just like relatedness to different regions with other actor networks there. These indicators will also be looked at to provide a holistic image of human agency and the chance for opportunity space to develop but won't be the main object of research.

4. Results

4.1. Social structure: creating a 'peripherality' map

Starting with the analysis of peripheral regions based on structural variables. First, each variable is projected onto a map of Gelderland to show how the values are geographically distributed on the municipalities scale. At first glance, there doesn't seem to be any clear geographical distinction between regions that score high or low on these variables. There seem to be fewer business locations in the municipalities bordering Germany and those in the north of Gelderland. It seems that there are generally more businesses located in the big cities but this isn't always the case when looking at Doetinchem for example or in the municipalities on the most western part of Gelderland, which show darker red, whilst being areas with less urban fabric. Some of the eastern regions (known as the 'Achterhoek') score relatively high. Looking at surplus value there is some indication that there is a divide between the western and the eastern municipalities. Areas around Nijmegen seem to score lower which may have to do with the high surplus value that Nijmegen has, essentially draining the neighboring municipalities. Overall municipalities with bigger cities tend to score higher. The map with the number of jobs variable seems to be quite similar to the surplus value which isn't odd, hence the decision to capture these variables together in one component. In all three maps, there seems to be some kind of spatial autocorrelation, however, this is only the case for the business location variable with a Moran's I-value of 0,39 and a significance above 99%, indicating a clear spatial clustering. This is interesting since only this variable shows some spatial pattern, whilst the rest are closer to spatial randomness. Indicating that relying solely on these variables does not give an adequate image of what it means to be 'peripheral'; categorizing space based on this already seems to poorly portray reality.

The disposable income variable shows that there are some municipalities, mainly those in the Veluwe and the big cities, which score lower. The cities might score lower because there are more diverse people in different income categories as opposed to higher-income smaller municipalities. What slightly stands out is that the municipalities on the Veluwe score relatively high on the former economic variables, but lower on the disposable income variable. This might have to do with the high number of jobs in sectors with relatively low wages such as tourism, agriculture, and logistics. A more detailed account of this will follow in the next paragraph. Furthermore, there are some strong outliers in terms of income of their residents, but not rich in terms of surplus value or productivity such as high-income residential-based municipalities such as Rozendaal and Westervoort. Concerning the odd distribution of this map, the high outliers, and the relatively moderate theoretical ground, this might not be a very useful variable in understanding peripherality. In terms of unemployment, The province seems to be quite equally distributed except for the cities which score lower. This variable is interesting because it does have a relatively strong theoretical foundation concerning peripherality, whilst seemingly showing the opposite. Maybe there is a difference between countries for whether unemployment has anything to do with peripherality. The Netherlands is perhaps just not big enough to see differences between unemployment on the municipalities' scale, as opposed to larger countries like the US where sometimes complete regions fall into the unemployment trap (Garcilazo & Spiezia, 2007; Rios, 2016; Smaal & Elhorst, 2025).

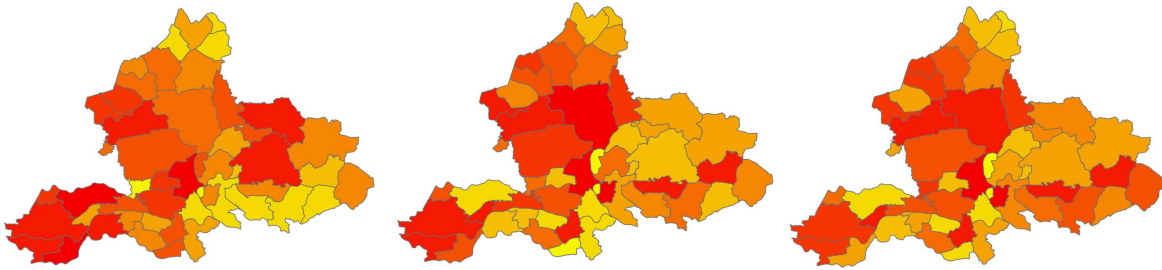


Figure 3 Business locations (1), Surplus value (2), Number of jobs (3)

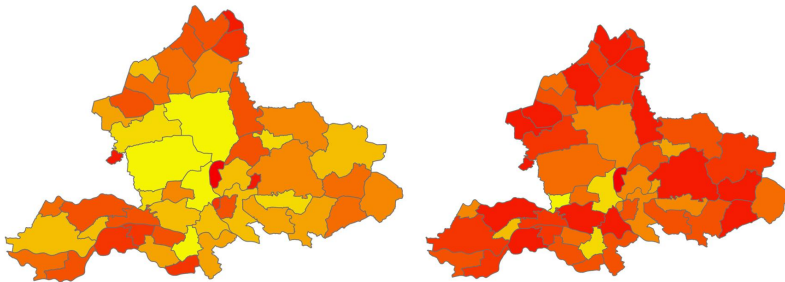


Figure 4 Disposable income (1), Unemployment (2)

Looking at the demographic variables there are some clear indications of spatial differences. Starting with net migration. In contrast to expectation, the eastern municipalities seem to attract a higher level of migration relative to the western municipalities. Especially Doetinchem, but also the other municipalities in the Achterhoek-region score relatively high which was not expected based on the common belief that people migrate from the hinterland such as the Achterhoek towards the Randstad; an understanding that a lot of present-day periphery conceptualizations use. An explanation might be the high level of retirees migrating towards this region (Haggeman & Mons, 2020), migration from neighboring countries as well as refugees coming from Ukraine, and Interregional collaboration and employment opportunities (Koster et al., 2024). Remarkable is the dark red line from south to north in the middle of Gelderland. These municipalities tend not to score as high on economic indicators but do so on net migration. When looking at home prices (WOZ-waarde) it becomes clear that this region has relatively cheap housing (Centraal Bureau voor de Statistiek, 2024), which might explain this migration. An explanation would be that because of the lower economic indicators, the home prices are relatively low, which attracts people who work in other regions to settle here whilst not being too far away from their work. A notable phenomenon is that Arnhem is experiencing the highest rate of outmigration relative to its population compared to other municipalities, despite its status as the third-largest and capital city in the province.

Looking at the map of inhabitants below the age of 25 there is a clear difference visible between the west and the east. This is perhaps what most present-day peripheries conceptualizations tap into. Even though the regions that showed some in-migration in the former map, still tend to have an older population. Perhaps it would be interesting to compare these maps over time. When looking at the dependency ratio, the same kind of pattern is visible although less clearly. The dependency ratio map shows a similar image as the inhabitants below 25, which is expected. There is a clear divide between the East and West regarding age. One explanation might be that the Randstad, the most prominent 'core' in the Netherlands is closer. Another explanation however might be that the red municipalities tend to fall in the commonly used 'biblebelt'

category, an area of the Netherlands that is strongly religious, these areas have a younger demographic overall because there are more children born; communities might prefer larger families (Peri-Rotem, 2016).

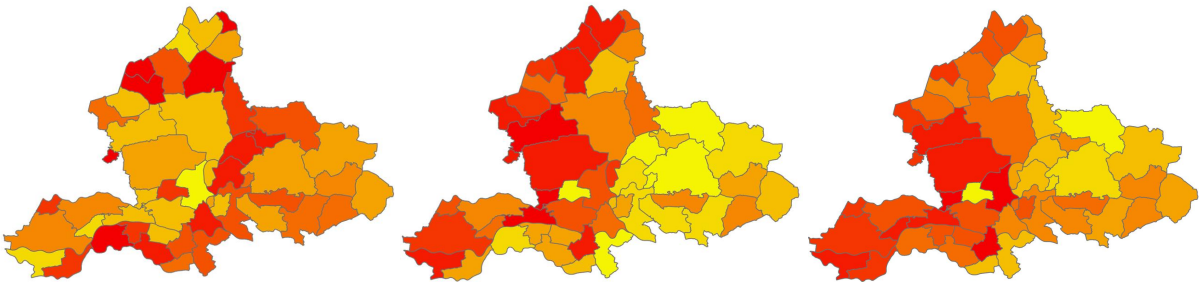


Figure 5 Net migration (1), Inhabitants below 25 (2), Dependency ratio (2)

When combining the variables into the earlier mentioned components, there is a clear division between the municipalities close to the Randstad and those further away on the variables about demographics. Although as seen before, people migrate more towards these provinces so perhaps in the future this divide will become less clear. The economic components however don't show any clear west versus east divide. At first glance, there are no real striking patterns in the economic components maps except for some higher-scoring municipalities seemingly clustering in some regions. As expected, the two economic maps don't align because their contributing variables don't correlate.

With that, the bridge can be struck to the case-study analysis. Because while these maps do give some idea of the geographic distribution of these variables, there cannot be made any hard conclusions from it, whilst many scholars still use these indicators for conceptualizing peripherality. In the next paragraph, the case-study approach is used, which gives a better understanding of the regional complexities behind these variable indications and why the municipalities score as such on these variables. The question is whether the human agency approach can be of use to better understand 'peripherality'.

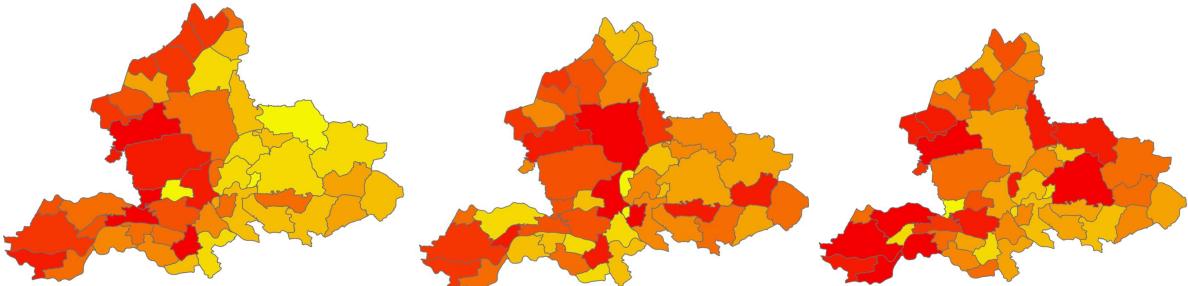


Figure 6 Component demographics (1), Component economic power (2), Component living area/ economy (3)

Combining these component-maps with the migration map creates the below shown 'peripherality-index' map. What becomes clear at first is the divide between East and West. Or better put; the Achterhoek vs the rest of the province. Within the societal debate, the Achterhoek region is typically considered peripheral or left behind, while the regions toward the Randstad are perceived as more central/core-like. This is what the below map shows as well which is quite interesting because the variables (or components) used don't correlate at first glance as seen in the factor analysis. Yet they indicate spatial differences based on quite theoretically sound

variables of 'peripheral' regions, indicating some form of 'left behindness' or 'peripherality'. When performing a statistical test on spatial autocorrelation it seems as though there is some form of spatial clustering based on a Global Moran's I-value of 0,2897 with an above 99% significance. What also shows is that the cities light up, as expected. This is evident in cities like Nijmegen and Doetinchem where a perceived core-periphery dynamic shows between the cities and the municipalities bordering them, more on this dynamic will follow in subsequent paragraphs.

On the left side of the map is a 'non-peripheral' region with some municipalities being a bit more orange, indicating that they are a slight bit more 'peripheral', but still scoring high relative to other municipalities in the province. Unexpectedly, Arnhem doesn't show to be a very strong 'core' with a core-periphery dynamic to its neighboring municipalities like Nijmegen and Doetinchem. The most logical reason is that Arnhem has a lot of outmigration and unemployment which leads to a higher 'peripherality' score. But there might also be other factors at play. For instance, scale is of large relevance as some municipalities are larger in land area than others such as Eden and Apeldoorn. Because of the scale, some of the core-periphery dynamics might not be visible in such a map. Furthermore, the municipalities around Arnhem have some of the biggest industrial areas. These have a high economic value in terms of GDP, number of jobs, etc., contributing to a lower peripherality score. What becomes clear is that spatial demarcation or 'bordering' is of high importance in categorizing space on variables as used in this paragraph. It fully depends on where the border of a region or municipality is drawn for the consequences of becoming 'peripheral', as was shown by this Arnhem case. This index thus is at all times just a perspective on regional inequality.

Lastly, the municipality of Oost-Gelre is striking as being core-like in the middle of the Achterhoek-region. These structural variables don't give a clear explanation for this except that this municipality scores relatively high on the economic power component. Perhaps there are some large businesses providing jobs, which propel this region economically forward. With this map, a structural image of peripherality is visualized based on variables associated with 'peripherality'. These variables can never explain the whole truth. After all, this structural analysis serves as an overview against which the case-study-analysis focusing on human agency can be compared. Understanding spatial complexity is all about zooming in and out and a general overview like this thus can never explain spatial complexity on its own, yet still much research about geographic differences relies solely on these indicators. The municipalities scoring a bit lower might indicate that they are a bit economically backward, and not having the best demographics. This is valuable input to steer the following paragraph which analyses human agency within these regions,

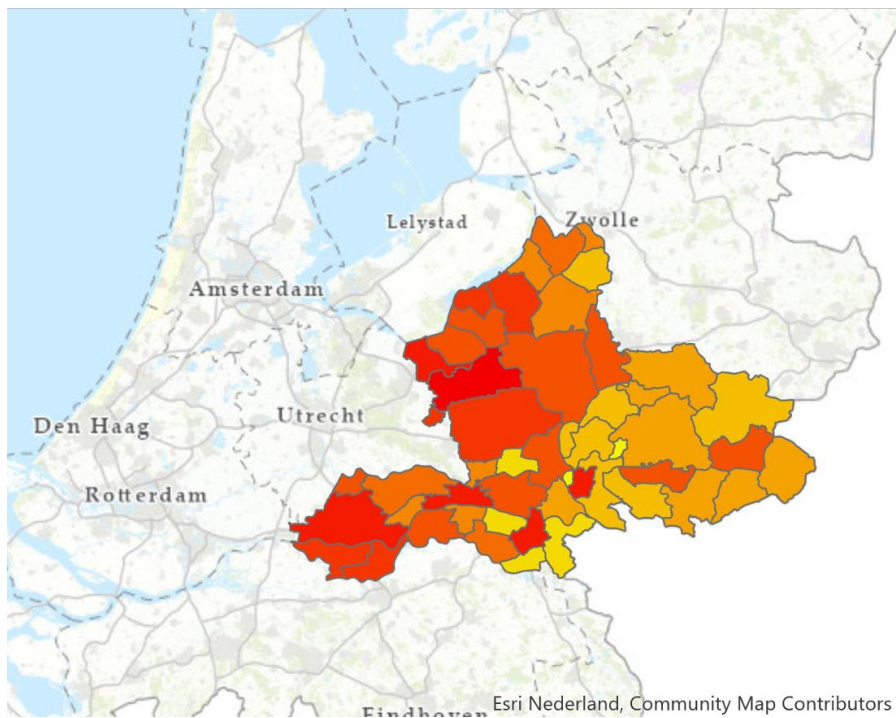


Figure 7 'Peripherality' index based on components + net migration

4.2. Human agency: a case study analysis

In this section, preconditions for the flourishing and distribution of human agency are analyzed in terms of differentiation of the actor composition and skewness of power relations. The backbone of this is that regions considered as 'non-peripheral' regions tend to have powerful and diversified path developments, strengthening the regional economy and demography. New path development and diversification involve the renewal of economic activities based on new knowledge. Actors in specific regional contexts interpret and utilize this in different ways, creating opportunity spaces for new path developments and diversification. Human agents tap into knowledge networks, institutionalized relations, and material linkages to create opportunity spaces. But it are the precondition of differentiation of the actor composition and skewness of power relation, that give human agents the ability to do so (Nilsen et al., 2023). In this way, structure and agency are connected, and made measurable in the regional context of this research, shifting conceptualization of peripherality to more human-agency incorporated.

With that, Let's dive into the empirics. As mentioned, the peripherality index computed into the earlier shown map provides the basis for this, as sort of a general overview. What is visible from the structure-based peripherality index is that the region of and around Nijmegen is interesting to analyze. We can see for example that Nijmegen is dark red, indicating it could have some form of a core function, while the municipalities around it are yellow and orange, indicating more 'peripheral' based on the used variables. Using a case-study-analysis on each municipality grants better investigation and understanding of the dynamic that is going on here, more on that later on in this chapter. Furthermore, the case-study-analysis also shows that this color grade map isn't the whole picture of peripherality and that these yellow-seeming regions also differ in relation to each other. In the following paragraphs, notable cases are covered concerning the differentiation of the actor composition and the skewness of power relations. Lastly, there is a paragraph devoted to the usefulness of this human-agency approach and the relationality between actors within and across regions.

4.2.1. Differentiation of the actor composition

The differentiation of the actor composition is measured by looking at businesses, organizations, universities, and (government) institutions within regions and how these are differentiated across and within sectors. As will be seen in this analysis, some regions tend to focus on only one or two sectors. Within those sectors, the organizations might differ, but still, there is a dependency on that specific sector which makes the differentiation of the actor composition not optimal for agency to flourish and perhaps makes regions too dependent on that sector. Other municipalities however will have more differentiated sectors and organizations within them, here opportunity space has better preconditions to emerge (Nilsen et al., 2023).

One region that stood out in the structural analysis as being less ‘peripheral’ than expected are the northern/north-western municipalities, ‘Food Valley’ and those on the Veluwe. These results can be very adequately explained by looking at the differentiation of the actor composition. What was mentioned in the interview I conducted was that these regions – which seem to correspond geographically to the widely considered ‘Bible Belt’-area – have a very strong economic basis in the self-employed sector (ZZP in Dutch). Also, family-run businesses are relatively prominent. As opposed to many other regions, the Bible Belt has a relatively young population, often young family members working in the family business. These businesses have strong local roots, improving economic performance strengthening regional agency and opportunity spaces (Amato & Patuelli, 2023). Perhaps the one sector that is dominating in this region is agriculture, stimulated by the Wageningen University of Research contributing to a lot of innovation in this sector. However, this does not mean that the regional economy is dependent; there doesn’t necessarily seem to be a path dependence on this sector.

Furthermore, there seems to be a relatively high sectoral variety based on the numbers coming from the statistical database (Gelders Zakboek). These sectors are often made up of self-employed businesses or middle-small businesses (MKB in Dutch). This entrepreneurial spirit is present in these regions, which often have strong social cohesion. This is also fostered and promoted by the regional public collaboration initiative ‘Regio Food-Valley’, actively facilitating collaboration between entrepreneurs, business- and research institutions (Regio Foodvalley, 2025). Innovative entrepreneurship is seen as an essential form of agency from the viewpoint of the trinity of change agency model that is used in this study. These actors act upon perceived opportunities with the strong ambition to make new things happen such as new development paths. At the same time, as was mentioned in the interview, people in these regions tend to save their money virtuously in an effort to reinvest it in their business, adding to the local entrepreneurial cohesion.

Agency is distributed among various firm- and system-level actors within a context of moderate economic diversity. Less than that found in metropolitan areas, but greater than in other considered peripheral regions. Here innovation directed by the Wageningen University of Research propels the region forward, whilst not being too dependent. The region still has very diversified and entrepreneurial businesses across and within sectors and also the public sector is present with public administration and military stations. A high differentiation holds the potential for actors to access a larger variety and depth of knowledge, networks, and resources, making opportunity space more able to emerge (Nilsen et al., 2023). Based on this perspective the food-valley/northern Veluwe region could be considered as at the same time economically strong and resilient, since there is a better ground for path development and path diversification, even though there is not one notable urban area.

In general, this trajectory of differentiated actor composition is not solely present in this region alone. As became clear during the interview; there is an invisible line going from Zwolle, which is on the northern border of Gelderland, towards the area at the far south-west beneath Utrecht known in Dutch as 'Rivierenland'. This region has a lot of middle- and small businesses contributing to a differentiated actor composition. Furthermore, this region is generally economically strong since it acts as a layer around the main metropolitan area of the Netherlands known as the 'Randstad', which is often considered the 'core' of the Netherlands. The result of this can be seen in the data, as it seems that this region often has a relatively young population, a positive net migration, and some larger firms propelling the region economically forward in terms of surplus value and jobs. Especially in the municipalities of Eden and Barneveld there are some larger firms located. What is evident from this human-agency-based analysis is that these firms, while being relatively large, don't dominate the region. In this way, the region profits from the agglomeration effects of these firms whilst not being too dependent. The differentiation of the actor composition is thus not hindered and agency seems to be relatively widely distributed.

Further South towards Rivierenland, it seems that this region also scores higher than expected on the earlier shown 'peripherality' index. In terms of differentiation of the actor composition, this region seems comparable with the northern Veluwe. However, there are some sectors which this region is quite well known for, especially agribusiness, more precisely fruit cultivation (Fruitdelta Rivierenland, 2025), for which the region receives EU funding to promote sustainable local food chains, connecting farmers, retailers, and consumers (EU cap network, 2021). There is no clear dependency on this sector since there is a wide variety of firms, businesses, and public sector such as municipalities, public sector alliances, and water authorities (Waterschappen in Dutch). Perhaps the only lacking sector in terms of opportunity space and path developments might be education since this region doesn't have any higher education institutions.

This lack of education might have a link to the rather large logistics sector, which is more reliant on the lower educated. Perhaps the most prominent threat for this region in terms of becoming 'peripheral' is the lack of the higher educated. These people either move north/west toward Utrecht and the Randstad, south towards Brabant, which specializes in technology, or east towards Wageningen, Arnhem and Nijmegen (Dijk & Broersma, 2010; Kooiman et al., 2018). The fruit cultivation sector is quite big, but the region is in no way dependent on this, rather this feature of the region is used as a branding strategy to attract tourists (agrotourism) as opposed to sheer economic value coming from the product itself (Fruitdelta Rivierenland, 2025). Perhaps the biggest dependency is the logistical sector. It is not odd that this sector is big in this region due to its advantageous geographic location. However, the differentiation of the actor composition might be threatened if this region were to become more dependent on this sector, especially in terms of the outmigration of young educated people.

What this last case shows is that the 'peripherality' index doesn't cover the regional complexity. The Rivierenland region seems not peripheral based on the used indicators however there are some indications that on economic and demographic axes, this region could have some threats in terms of resiliency and path dependence. The differentiation of the actor composition might be a valuable regional precondition to consider. Another example that shows how the 'peripherality' index only shows a partial truth is in the net migration numbers. Since this region shows slight positive migration, this might show a positive transformation in terms of development. However, it seems that this migration is mainly coming from people working in the Randstad since there is a good road and railway connection from the Rivierenland to the Randstad. Many of these people don't work in the region itself, which doesn't add to the economic development and opportunity

space (Mærsk et al., 2023). At the same time, many young people might leave the region in pursuit of higher education. These regional complexities are often not visible from the purely structural analysis. The case in Rivierenland shows that logistics is relatively dominant and that it might be especially threatening since this might lead to an outmigration of educated youth, with this the link to the skewness of actors is made, which the next paragraph will focus on.

4.2.2. Skewed power relations

Skewness of power relations is similar to differentiation of the actor composition but slightly different. As opposed to the differentiation of actors, skewness of power relations assesses at the distribution of them, thus looking more at spread of the power of actors within firms, sectors and organizations. Some regions for example might show skewed power relations, meaning that there are only one or a few dominating sectors, organizations, or businesses, which hinders upcoming initiatives in other sectors or organizations. This makes agency less able to flourish across the regions, and thus there would be lower-quality opportunity spaces (Görmar et al., 2023). This engenders dependency, making it particularly difficult for peripheral regions to diversify (Mackinnon, 2011). It is a measure for the degree for whether power is concentrated in dominant firms or sectors. The other side of the coin is that strong regional sectors, firms, or organizations might provide high-value-added jobs or innovation, propelling regions forward (Martin & Sunley, 2006). The skewness of power relations regional precondition is thus tricky because it might indicate positive growth in terms of escaping the periphery categorization as well as some form of path dependency on too dominant sectors or firms. This was mentioned in the interview as well; some, mostly bigger firms, are leaders in terms of development and innovation because their global production network demands this from them. However other mainly smaller businesses fall behind simply because the drive is not as big or they simply don't know how. It was mentioned during the interview that the eastern municipalities are an example of this. This region is known as the Achterhoek, and that is what this section will focus on.

The Achterhoek is an interesting region. Based on the structural analysis, this region clearly shows as being more 'peripheral' with the city-municipality of Doetinchem and the municipality of Oost-Gelre scoring a bit higher. The regional precondition of skewness of power relations might indicate why the Achterhoek scores in the way it does. Historically, Achterhoek has had a soil high in iron ore, which later on the iron industry was built on, which has helped this region move forward economically. Later, when the economic base of many Western countries shifted from materials and industry towards manufacturing, refinery, and knowledge-based economies, the economy of the Achterhoek shifted as well. This transition is still visible in the economic structure of this region. Many firms still have their businesses related to this iron-dominated sector. They often produce high-quality parts of machinery or other industrial manufacturing which are processed in German chains (interview). In some sense the Achterhoek is still a bit dependent on this type of manufacturing with a basis in Iron. However, the economy of this region has changed greatly over the years.

What became clear from the interview is that there is a clear distinction between the leaders and the laggards. Where the leaders can change based on macroeconomic transformations in their global production networks, and innovate, the laggards fall behind and don't want or even know how to change. A big problem facing the Achterhoek is labor supply (Centraal Bureau voor de Statistiek, 2025). Especially those bigger firms in manufacturing, engineering, and ICT that want to innovate, lack employees both at low- and high-skilled levels. Which results in them finding it difficult to change in relation to macroeconomic transformation. Perhaps, this labor problem can be attributed to the sheer Geographic distance towards more higher populated areas such as the

big cities in Gelderland or even the Randstad, since the Achterhoek itself has a relatively low population. Furthermore, the Achterhoek is experiencing an aging population. While there is generally a positive net migration, it is not enough to meet the growing labor demand. In these instances, the value of higher education becomes evident, since the Achterhoek doesn't have any of these institutions competing with the rest of Gelderland or the Netherlands.

While this all sounds very negative, there are some facts to mention about the regional preconditions in the Achterhoek that hint at path diversification and resiliency. For example, there are a lot of family-owned businesses, middle-to small businesses, and self-employed businesses such as in the north-western regions mentioned earlier. Furthermore, the role of social cohesion is very present in the Achterhoek making the region very resilient, as it proved that during the COVID-crisis the region stayed robust (Koster et al., 2024). While the Achterhoek doesn't have the biggest firms relative to the big cities in Gelderland or the Netherlands, there are a lot of specialized innovative businesses which often are exceptionally innovative in a sector specialization (Hospers, 2024). With that, there are some of the structural conditions that often put the Achterhoek in the periphery categorization. These conditions often have to do with the Geographic axis mentioned in the conceptual model. The Achterhoek has a geographic disadvantage which is especially evident when looking at labour, migration and commute.

It is difficult to speak of any real skewed power relations in the Achterhoek or the province of Gelderland in general. Perhaps in the Achterhoek as a result of the iron-dominated economy but the economic profile of this region also shows very diverse businesses. Perhaps the biggest threat facing the Achterhoek is that firms have difficulties in meeting the demand for innovation which their global production networks require. Especially the supply of labor is under pressure, which probably has a link to its larger geographic distance from other cities in the Netherlands. Another threat is the lack of public administration and education, as was also the case in Rivierenland. The Achterhoek seems quite dependent on private businesses and firms.

After all Gelderland, as well as the Netherlands is relatively small, while having a lot of people. In some considered peripheral regions in other countries like the US, Britain, Italy, or France, there are different dynamics present, where some regions really are dependent on one firm or sector. Like oil refineries in the bordering counties between Louisiana and Texas, or agriculture in southern Italy (Fina et al., 2021; Garofalo, 2017). In the Netherlands this is simply not the case. Hence it was difficult to understand peripherality better using this regional precondition for human agency. The Netherlands is a small and relatively homogeneous country in terms of differentiation of the actor composition and skewness of power relations. There is just not that much geographic variety, which makes analysis more difficult. This indicates the difference between academic works and models, and the complexity of space, which differs in every place often requiring inductive approaches.

4.2.3. Opportunity space and cross-border relationality of structure and agency

The set of possible actions, strategies, or development pathways that are available to actors in a specific spatial- and institutional context is constituted in opportunity spaces. Shaped by former historical path development and structural conditions but most importantly by actions that humans take. In the trinity of change agency model, it are the three proposed agents; the Schumpeterian innovative agent, the institutional agent, and the place-based leaders, that can reconfigure their regional context and create opportunity spaces. Within these opportunity spaces, new path developments and diversifications can be created, making regions more resilient (Kurikka & Grillitsch, 2021). It are essentially those regions that don't get these

opportunities to develop new paths, which are most dependent on former structures or relations to other regions. They lack the ability to both specialize and diversify their development paths, making them vulnerable to structural change such as in times of economic hardship (Hassink, 2017). Exactly these regions would be considered underdeveloped or less resilient from the perspective of human agency as approached through the notion of opportunity spaces.

In the regional context of this thesis, regional preconditions are examined that are important for the flourishing of agency. That is the freedom, assets, and networks for the three proposed agents to create opportunity spaces. The kind of approach discussed in this thesis locates agency not in the attributes of individual agents but in the relationships connecting agents to structures in opportunity spaces. What this analysis based on human agency essentially gives is a model to look at space. That model is the theorization of human agency through the notions of opportunity space and path development and the operationalization by way of the regional preconditions as mentioned earlier. While this approach gives a more inductive approach as opposed to the structural variable analysis, it still doesn't capture the real complexity of space, as no model does.

In locating agency in relation to structure through the notion of opportunity space, the relatedness of structures across municipal boundaries becomes clear. The differentiation and the skewness of the actor composition isn't just a regional precondition. It are conditions that are created within networks of relations between human agents across borders and regions. With this in mind, the regional precondition mentioned earlier, together with the notion of opportunity space are analyzed in terms of cross-border relations of actors.

The importance of relationality between regions becomes clear in Nijmegen and the surrounding municipalities. Nijmegen is economically and demographically upward mainly due to the university (RU), the university of applied sciences (HAN), two hospitals, large firms like NXP semiconductors, Dustin and Royal SMIT, and Nijmegen hosting the 'Modulaire Gemeenschappelijke Regeling' in which neighboring municipalities are part which works in employment. When looking at the businesses and organizations I use for the agency-based approach, we can see that Nijmegen has very diverse organizations. Perhaps there is a slight emphasis on health with the University and the hospital as big stimulators for the regional economy, but they don't monopolize and aren't too dominant. Nijmegen has big firms in trade and industry both in wholesale as in retail and plenty of education. This makes the city resilient in economically more difficult times.

Nijmegen seems to have a rather differentiated actor composition with many firms and organizations spread across sectors and differing in size. Power relations are relatively balanced and together with the high population density this makes Nijmegen a region where agency can flourish and where opportunity space is constantly created. Nijmegen has strong path developments such as in health and microtechnology, but also good conditions to build on other path developments. This makes Nijmegen a notable regional center.

The neighboring municipalities score lower on the 'peripherality' index. For example, Beuningen is a small municipality with mostly small to medium-sized businesses. It is plausible that Nijmegen takes away the bigger businesses which makes Beuningen dependent on Nijmegen. Beuningen has quite some diversified organizations in health, industry, trade, and governance. But these are too small in size to compete with Nijmegen, with its strong educational institutions. On the regional preconditions indicating human agency and opportunity space, Beuningen performs sufficiently because it has some diversification within and across sectors and relatively balanced power relations, especially those in the ZZP category (Self-employed). However relative

to Nijmegen, the power relations aren't balanced at all since Nijmegen has all the larger companies and institutions making Beuningen and its inhabitants dependent on this. The municipality south of Nijmegen called Heumen shows similar characteristics as Beuningen. Although there is one larger industrial firm, Heumen is still quite dependent on Nijmegen. Interestingly as opposed to Beuningen, Heumen has a positive net migration. Probably from people working in Nijmegen. In this way, Beuningen en Heuman can be seen as an expansion of Nijmegen, or perhaps Nijmegen's 'peripheries'.

The municipality of Berg- en Dal, on the east of Nijmegen, has a rather different spatial-economic profile. There is one very big firm; The Maartenskliniek which is specialized in health. Furthermore, almost the entire top 20 biggest businesses/organizations are dominated by health. The differentiation of the actor composition is thus not advantageous and the power relations are also quite skewed; the Maartinskliniek dominates this municipality. This makes Berg- en Dal very dependent on this sector. Future path diversification is thus not expected. Based on an agency perspective, this municipality seems to be able to produce less opportunity spaces and future path development or diversification, making this region relatively vulnerable. For Berg- en Dal, it might be important to consider how the regional economy can sustain and be resilient relative to the big neighboring city of Nijmegen, which also has a sector specialization in health.

Moving up from Nijmegen is the province capital Arnhem with its bordering municipalities. The clear center-periphery dependency dynamic that was visible in Nijmegen isn't at first sight as clear in Arnhem looking at the structural peripherality map shown before. South of Arnhem are two municipalities that also border Nijmegen. These are Lingewaard and Overbetuwe. From both the peripherality index as well as the case-study-analysis it is clear that Overbetuwe is on the 'winning side' in terms of economic performance. Lingewaard, in which 60% of business locations are self-employed, might indicate a high differentiation of the actor composition in the self-employed sectors, but lacking in other sectors. The two biggest businesses are both in employment mediation, which doesn't really have strong local roots, indicating less of an ability to create opportunities and economic development (Birkholz, 2025). There are some firms in industry, trade, and logistics, which make use of the A15 highway. All this indicates that in Lingewaard, agency is sufficiently distributed, but lacking in economic power. Overbetuwe on the other hand has one giant firm for retail. This firm is good for 800-1000 jobs and dominates the region. There are also some other bigger firms which are quite differentiated between sectors. The location for these firms might be made in order to have solid infrastructure towards The Randstad, whilst being situated between two cities and close to the German border. This might add the possibility of opportunity space to emerge.

What these cases show is the relational aspect of regional economics. Overbetuwe has a stronger economy than Lingewaard, not because Overbetuwe has some very solid regional preconditions, but rather because of its relations to other firms, businesses, organizations, and actors, even in other municipalities. Because of these dynamics related to other regions, the economy of Lingewaard performs as such. What can be seen from this way of thinking is that agency cannot solely be measured in terms of regional preconditions. Yet, this relational approach also does not explain everything as regions still are individual entities with their own economies and preconditions explaining regional specificity. Especially in the Netherlands there clearly is a lot of regional relatedness but to a limited extent (Thissen et al., 2019). It is at all times a multifaceted approach that is necessary to understand spatial dynamics, especially when categorizing regions, or more broadly, making any kind of generalization of space/regions. In the next chapter, I will still tend to do so. To find some kind of generalization of the above-discussed results, and conclude

this research. To answer the question of whether the human agency perspective can bring a better understanding of conceptualizing peripherality.

5. Conclusion

This thesis set out to rethink the concept of peripherality by shifting the focus from conventional structuralist interpretations to an approach grounded in human agency. In both academic and policy contexts, peripherality is often treated as a static condition, defined by geographic remoteness, economic underperformance, and demographic decline. These views, however, tend to mask the complex and relational processes that shape regional development. Through a dual-method approach that combines structural analysis with a human agency-based case study, this thesis aimed to offer a more nuanced and dynamic understanding of what it means to be 'peripheral'.

The structural analysis provided a general overview of socioeconomic and demographic indicators commonly used to label regions as 'peripheral'. While some spatial patterns were observed, such as a moderate clustering of less favourable indicators in the Achterhoek and the geographic relatedness of less-performing regions close to better-performing regions as for example in Nijmegen and its neighboring municipalities, overall, the findings showed a fragmented picture. The peripherality index revealed no clear core-periphery binary in the province of Gelderland other than a slight division between east and west mainly because of demographic indicators. This underscores the limitations of using structural variables fitted into one category to define regional conditions and justifies the need for a complementary lens.

When looking not just at the peripherality index but at each individual variable, a better understanding of regional dynamics was made. Some variables might correlate with or even explain other variables. Comparing these variables is of use in understanding regional dynamics. In this way, the structural analysis helped guide the human-agency-based analysis with a general overview of regional dynamics in Gelderland. The human agency-based analysis, through the concepts of opportunity space and path development, added explanatory depth.

Using the region-based human agency framework, it became clear that regions differ in their capacity to create opportunity spaces and future path developments and diversification. For instance, the case of Rivierenland and the Achterhoek illustrated how limited diversification and overdependence on dominant sectors or firms constrain opportunity spaces and reinforce vulnerability. Also interesting is Foodvalley's/Veluwe's differentiated actor composition and strong regional firms and institutions. Overall using a case study approach on the municipalities explained a lot of the regional complexity, especially when looking at the relations between regions, spatial complexity is better understood.

Still, this relational way of thinking also doesn't explain everything. There are still some regional preconditions that hinder economic growth making regions unable to escape the 'peripherality' categorization, such as the geographic disadvantage that the Achterhoek has. Especially in terms of labor supply this structural threat becomes clear, also affecting regional agency in terms of skewed power relations, as smaller businesses often cannot compete with the larger firms on issues such as innovation. To understand the complexities of space and regions it is important to triangulate focus from different scales, methods, and topics. The human-agency approach adds to creating a holistic image of space, it can explain why some regions with similar structures perform economically differently, and why they are categorized differently in the core-periphery binary. Perhaps this was most visible in the region around Nijmegen where Berg-en Dal seems less resilient than the other neighboring municipalities due to its dependence on the health sector, which Nijmegen also specializes in.

That brings me to the foundations of the human-agency approach; opportunity space and path development. These concepts explain spatial dynamics in relation to economic resilience quite well, which is strongly connected in societal and academic debates to the 'peripheral' categorization, as 'peripheral' regions are considered less economically resilient and produce fewer (economic) opportunities. To create opportunity spaces, agency needs to flourish such as in metropolitan cities. The regional preconditions of differentiation of the actor composition and skewness of power relation among actors are indicators of this and showed that some regions are perhaps promising in terms of opportunities such as the Foodvalley region due to its differentiated actor composition and strong institutions, such as Wageningen University.

It is this dynamism that is of utmost interest and relevance. That is the balance between having differentiated actor compositions and balanced power relations, while also having strong firms or organizations propelling a region economically forward. The crux is to be not too dependent on them, while also enjoying the agglomeration effects that these regional leaders exert. Finding this balance is an inquiry for each region alone, the human agency approach might be of valuable use in this. This approach won't explain the complete complexity of space, rather, it adds to a holistic understanding of it. The two methods are not mutually exclusive; rather, they are complementary. Together, they offer a more complete framework for understanding regional economic dynamics. The structure-based analysis offers a broad overview and helps identify regions that may warrant attention. However, it is the human agency lens that reveals the underlying reasons why certain regions lag behind, and how some may overcome those constraints.

With this analysis of regional dynamics, a better understanding can also be formed about the categorization of space. The categories of core and periphery are often not based on regional complexity but on the dualism between the winning city/core and the losing hinterlands/peripheries. What this study taps into is that this dualism is often problematic and even polarizing. Holistic accounts of space are necessary to escape the poorly conceptualized binary. This study examined the Dutch province of Gelderland and tried to explain its regional complexities in terms of human agency, regional preconditions, opportunity space, and path developments/diversification. The 'core' and 'periphery' binary doesn't suit this complexity as operationalized in much present-day (Dutch) literature. Categorizing cores and peripheries, or left-behind regions extracts the complexity of regions and perhaps even nullifies these regions.

This thesis contributes to the academic debate by reinforcing the idea that peripherality is not a fixed status or a universal condition but a relational outcome shaped by structural conditions and human agency. Rather than simply rejecting the use of peripherality as a concept, this study advocates for using it more critically and constructively. To account for regional diversity and human agency. Ultimately, regions should not be understood solely through what they lack, but through the dynamics that define their position within broader spatial networks.

At last, a broader debate on social and spatial inequalities and the actual meaning of local and regional development is necessary. While the notions of human agency, opportunity space, and path developments help in understanding spatial-economic dynamics, which the 'periphery' categorization is often poorly based on, this also isn't the whole picture. I suggest that actors from the 'peripheries' need to take part in these debates, bringing in their perspectives on how to cope with ongoing peripheralization processes to find solutions for their particular needs and challenges. This brings me to the last chapter, in which I will reflect on this study within the context of spatial categorization and 'peripheralization'. I will shed light on the theory, methods, and results within this study with a critical, future-oriented perspective.

6. Reflection

Central to this thesis is the geographic categorization of regions into the ‘core’ and the ‘periphery’ or whatever binary is used to describe regions in terms of advantageous or inferior; winner versus loser. I tried approaching this categorization by understanding the different ways of conceptualizing peripheries in terms of geographic distance, structural variables, and human agency. It is this last conceptualization of human agency that could provide a better understanding of peripherality outside of the structure-dominated approaches used within societal and academic debates. Through the notions of opportunity space and path developments, two regional preconditions were found to link human agency to broader regional structures, measurable in the regional context of this study; Gelderland. In this way, agency is located not in the attributes of individual agents but in the relationships connecting agents to structures in opportunity spaces.

Firstly, I’d like to note that there are multiple ways of locating agency in relation to structures and regions. I used the trinity of change agency model and the notion of opportunity space and path development. However, future research might consider other approaches. Görmar & Lang (2019) have made a very solid overview of human-agency approaches within regional structures. Even relating human agency to opportunity space could be done in various other ways than the regional preconditions used in this study to better understand spatial dynamics. I suppose when considering the human-agency approach used in this thesis, this could be expanded to the whole of the Netherlands since it does give a better understanding of regional dynamics. With this focus on peripheries, the polarizing binary that is core versus periphery could be better understood and perhaps be dismantled.

This operationalization of human agency might be well suited for the context of this study because it made these concepts quantitatively measurable and provided an overview of ‘peripherality’ in Gelderland. However, this approach perhaps does not give a thorough understanding of the inner regional dynamics of human agency. That is, this thesis at all times stayed at the general overview level of – In this case - Gelderland. To understand the complexity of the dynamics of agency within regions better, a qualitative place-based approach would be better suited. Such an approach could bring the perspectives of people within the studied regions to the fore using open or semi-structured interviews for example. Similar approaches would also show how to cope with ongoing peripheralization processes and to find solutions for the particular needs and challenges of people within ‘left-behind’ regions. It is important to hear these voices since they are the subject of this ‘peripheralization’

Based on the above, future research can build upon this thesis to locate regional complexity within Gelderland. Future research might investigate these inner-peripheral dynamics incorporating the human-agents themselves which were often discussed in this thesis. Asking residents of considered ‘peripheral’ regions how they understand their own positionality could offer new insights, particularly for policymaking. People in such regions likely view their place very differently than those living in so-called core areas

With that, this thesis builds on Economic geography literature to better understand space in the Dutch context. The aim was to better understand the ‘periphery’ using a more human agency-included approach. Linking this theory to Gelderland was very interesting as some regional dynamics came to light that would not be visible before. I started this thesis about perceived spatial polarization, what I have noticed for myself is that with this better understanding of space, some of the polarizing dualisms even seem more out of touch with reality than I thought before.

That is not to say that some regions are more disadvantaged than others because there are spatial differences. Nevertheless, it would be more beneficial to understand precisely what it signifies to be considered 'peripheral' or 'left behind', and in relation to who or what, as opposed to merely categorizing space in an inadequately conceptualized binary. With this study, future research on spatial polarization is better equipped to conceptualize spatial categories, as opposed to the prevalent core-periphery categorization that is used today being the Randstad vs the rest of the country, or the city vs the countryside.

To end this thesis, I want to take a final step back to think about my topic. I started this thesis out of a fascination for spatial categorization. I mentioned that we as humans categorize space to make sense of the world. But in doing so, it also simplifies, and with simplification comes consequences. Categories can become binaries, and binaries can polarize. Working on this project, I came to realize that the often mentioned agents within the 'peripheries' might not want to be considered peripheral because that categorization itself might hinder their development. It is thus the normative connotation that the peripheries often have relating to being on the fringe of something, which isn't just descriptive. Rather, it has an evaluative judgment with consequences for people within them. Being considered out of vision has real material implications. I hope that future research will be aware of this, and continue to consider this. To try to understand the spatial complexity of being categorized as the underdog.

In this thesis, I advocate for a better understanding of the term 'periphery' because this part of the binary often gets overlooked as opposed to the 'core'. Ultimately because I want combat polarization. However, a question I have been asking myself while working on this thesis is whether polarization is something undesirable. Perhaps polarization is sometimes necessary to change the way we think about difference. This realization invites a broader philosophical question: What is the cost of being named? To label a region as peripheral is to place it in relation to a center. Categorization is never neutral. I will continue to think about who will benefit from this categorization and who won't.

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Annex

I. Interview guide

Interview guide: interview with Dominique Brinkhorst

Dominique is a former employee of regional economics, now focussing on monitoring, at the province of Gelderland. The focus of this interview is on the perspective that Dominique and the province of Gelderland has on peripherality. I want to discuss the regional context of municipalities in Gelderland related to the term 'Periphery'

Date: may 19th

Introduceer mijn onderzoek en waarom ik Dominique wil interviewen en hoe ik bij haar terecht ben gekomen

Start interview

- Kan je kort uitleggen wie je bent en wat je doet voor de provincie Gelderland
- Ingaan op werk en scriptie van Dominique

De term periferie

- Wat betekent deze term voor jou? Ken je de term?
- Wat definieert deze term?
- Wat voor een indicatoren spelen hierbij een rol
- Hoe kijk jij als medewerker van provincie Gelderland tegen deze term aan? Wat verschilt daarbij met de kijk van de provincie Gelderland

Kaart tekenen met regio's die perifeer/core zijn

De rol van economie

- Welke rol heeft de economie of economische indicatoren bij het creëren van deze classificatie in periferie?
- Spelen andere overkoepelende processen hierbij ook een rol?
Bijvoorbeeld cultuur, politiek, demografie, sociaal, technologie

Op basis van wat er besproken is, wat betekent het om perifeer te zijn?

- Wat houdt de ruimtelijke categorisatie in, kan dit gezien worden als een "winners vs losers"

De rol van human-agency

- Het creëren van (economische) kansen
- Differentiatie van de actor compositie
- Skewness of power relations
- Development paths en opportunity windows

Met de rol van human-agency, zou je aanpassingen willen maken aan de kaart die dit beter belichten?

De essentie van dit is de ruimtelijke categorisatie die gebruikt wordt

- Wat is jouw perspectief hierop?
- Is dit nuttig?
- Zit hier een soort van "waarheid" in?

Heb jij nog vragen of opmerkingen?

- Bedanken voor haar tijd

II. Mental map interview



*circles indicate peripheral areas, lines indicate areas with diverse firms and sectors

III. SPSS output factor analysis

		Correlations							
		vest	toeg v. W	bane n	Bestee dbaar inkome n	migrati esaldo	25-	% werkloo sheid	Grijz e druk
vest	Pearson Correlatio n	1	,274	,213	-,016	-,181	,114	-,143	-,190
	Sig. (2- tailed)		,052	,134	,912	,204	,428	,318	,181
	N	51	51	51	51	51	51	51	51
toegv. W	Pearson Correlatio n	,274	1	,949* *	-,311* *	-,332* *	,388* *	,256	- ,507**
	Sig. (2- tailed)	,052		<,00 1	,026	,017	,005	,070	<,00 1
	N	51	51	51	51	51	51	51	51
banen	Pearson Correlatio n	,213	,949* *	1	-,380** *	-,349* *	,331* *	,337* *	- ,472**
	Sig. (2- tailed)	,134	<,00 1		,006	,012	,018	,016	<,00 1
	N	51	51	51	51	51	51	51	51
Besteedba ar inkomen	Pearson Correlatio n	-,016	- ,311* *	- ,380* *	1	-,037	,078	-,265	,132
	Sig. (2- tailed)	,912	,026	,006		,797	,588	,060	,356
	N	51	51	51	51	51	51	51	51
migratiesal do	Pearson Correlatio n	-,181	- ,332* *	- ,349* *	-,037	1	- ,319* *	-,261	,423**
	Sig. (2- tailed)	,204	,017	,012	,797		,022	,065	,002
	N	51	51	51	51	51	51	51	51
25-	Pearson Correlatio n	,114	,388* *	,331* *	,078	-,319* *	1	,058	- ,760**
	Sig. (2- tailed)								
	N								

	Sig. (2-tailed)	,428	,005	,018	,588	,022		,688	<,001
	N	51	51	51	51	51	51	51	51
% werkloosheid	Pearson Correlation	-,143	,256	,337*	-,265	-,261	,058	1	-,381**
	Sig. (2-tailed)	,318	,070	,016	,060	,065	,688		,006
	N	51	51	51	51	51	51	51	51
Grijze druk	Pearson Correlation	-,190	-,507*	-,472*	,132	,423**	-,760*	-,381**	1
	Sig. (2-tailed)	,181	<,001	<,001	,356	,002	<,001	,006	
	N	51	51	51	51	51	51	51	51

** . Correlation is significant at the 0.01 level (2-tailed).

* . Correlation is significant at the 0.05 level (2-tailed).

Communalities

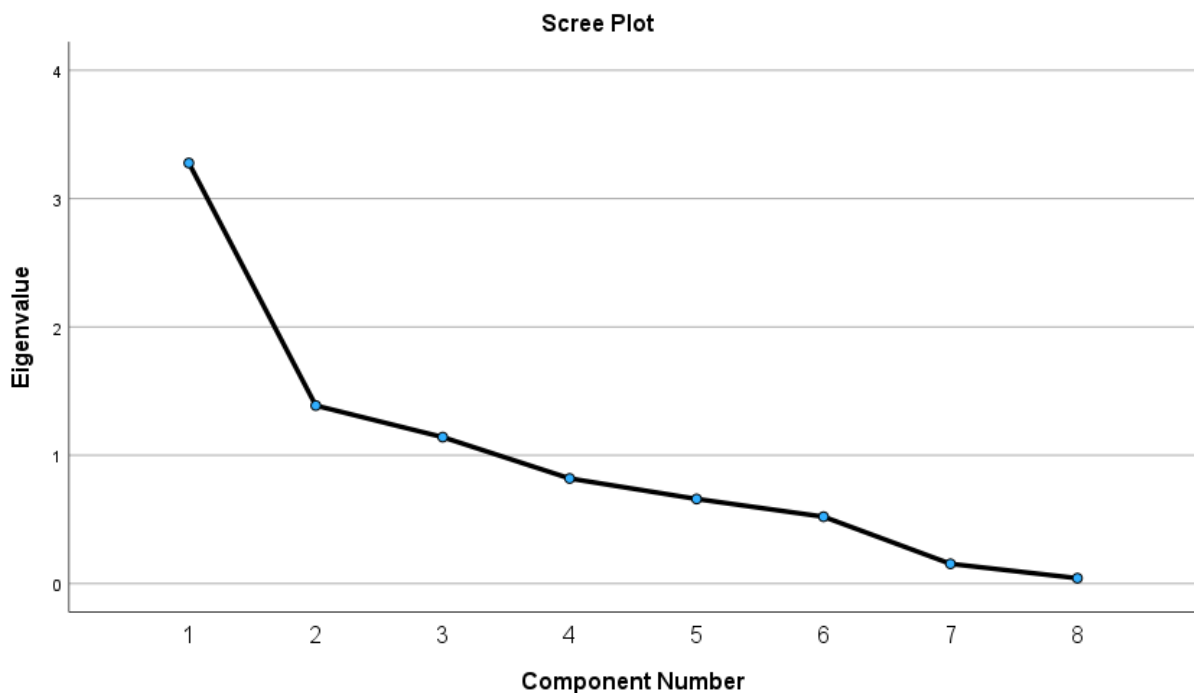
	Initial	Extraction
vest	1,000	,711
toegv. W	1,000	,855
banen	1,000	,867
migratiesaldo	1,000	,433
Besteedbaar inkomen	1,000	,671
% werkloosheid	1,000	,706
Grijze druk	1,000	,808
25-	1,000	,753

Extraction Method: Principal Component Analysis.

Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	3,277	40,966	40,966	3,277	40,966	40,966	2,445	30,568	30,568
2	1,387	17,339	58,305	1,387	17,339	58,305	2,171	27,134	57,702
3	1,141	14,264	72,569	1,141	14,264	72,569	1,189	14,868	72,569
4	,819	10,237	82,806						
5	,659	8,240	91,046						
6	,521	6,512	97,558						
7	,154	1,920	99,478						
8	,042	,522	100,000						

Extraction Method: Principal Component Analysis.



Covariance Matrix

	vest	toegv. W	banen	migratie saldo	% werkloos heid	Grijze druk	25-	Besteedb aar inkomen
vest	1,000	,274	,213	-,181	,143	,190	,114	-,016
toegv. W	,274	1,000	,949	-,332	-,256	,507	,388	-,311
banen	,213	,949	1,000	-,349	-,337	,472	,331	-,380
migratiesaldo	-,181	-,332	-,349	1,000	,261	-,423	-,319	-,037
% werkloosheid	,143	-,256	-,337	,261	1,000	-,381	-,058	,265
Grijze druk	,190	,507	,472	-,423	-,381	1,000	,760	-,132
25-	,114	,388	,331	-,319	-,058	,760	1,000	,078
Besteedbaar inkomen	-,016	-,311	-,380	-,037	,265	-,132	,078	1,000

KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		,607
Bartlett's Test of Sphericity	Approx. Chi-Square	217,198
	df	28
	Sig.	<,001

Component Matrix^a

	Component		
	1	2	3
vest	,302	,277	,737
toegv. W	,863	-,183	,278
banen	,858	-,287	,219
migratiesaldo	-,568	-,288	,167
% werkloosheid	-,460	,413	,569
Grijze druk	,809	,295	-,258
25-	,637	,556	-,198
Besteedbaar inkomen	-,333	,738	-,124

Extraction Method: Principal Component Analysis.

a. 3 components extracted.

Rotated Component Matrix^a

	Component		
	1	2	3
vest	,162	,214	,799
toegv. W	,461	,771	,219
banen	,416	,824	,121
migratiesaldo	-,647	-,121	,003
% werkloosheid	-,285	-,426	,666
Grijze druk	,862	,246	-,071
25-	,863	-,032	,085
Besteedbaar inkomen	,213	-,771	,179

Extraction Method: Principal Component Analysis.

Rotation Method: Varimax with Kaiser Normalization.^a

a. Rotation converged in 5 iterations.

Component Transformation Matrix

Component	1	2	3
1	,756	,652	,050
2	,577	-,701	,418
3	-,308	,288	,907

Extraction Method: Principal Component Analysis.

Rotation Method: Varimax with Kaiser Normalization.

IV. Tables of variables used in maps

Individual variables

Gemeente	vestigingen	Toegevoegde waarde	banen	migratiesaldo	Besteedbaar inkomen	werkloosheid	inwoners onder de 25	Grijze druk
			-				-	-
Aalten	-1,20109	-0,66418	0,338 22	0,18623	-0,13302	0,72345	0,2274 6	0,383 78
Apeldoorn	-0,0973	2,00533	1,565 62	-0,76821	-0,38234	-0,77234	0,1609 8	0,286 52
Arnhem	1,96288	1,76442	2,088 41	-4,06467	-0,3891	-2,51742	0,2711 2	2,029 32
Barneveld	1,62482	1,32318	1,243 51	-0,77679	-0,28021	0,47416	2,5313 5	1,224 95
Berg en Dal	-0,55001	-1,09883	- 0,460 36	0,33702	-0,20116	-0,02444	1,1913 8	0,920 03
Berkelland	-0,35428	-0,41374	- 0,456 26	-0,28733	-0,24268	0,47416	0,8257 5	1,054 09
Beuningen	-0,52923	-1,01985	- 1,131 05	-0,78472	-0,09809	-0,27374	0,3936 5	0,420 58
Bronckhorst	1,48606	-0,70889	- 0,393 95	-0,34498	-0,17557	0,97275	-1,1249	- 1,590 33
Brummen	-0,62964	-0,71491	- 0,670 56	0,87221	-0,03055	0,22486	1,2910 9	1,054 09
Buren	2,05414	-1,06241	- 1,139 46	-0,03321	-0,08973	0,72345	0,2274 6	0,554 65
Culemborg	0,71189	0,24173	- 0,011 82	0,58419	-0,14282	-0,52304	0,1714 1	0,688 71
Doesburg	-0,81324	-0,88631	- 0,938 4	0,24109	0,22934	-1,27093	1,7564 3	1,590 33
Doetinchem	-0,26027	0,99377	- 1,419 5	0,36779	-0,2967	-0,52304	0,1942 2	0,286 52
Druten	-0,42689	-0,84191	- 0,460 81	0,69509	0,00638	0,47416	0,3604 1	0,554 65
Duiven	-0,26803	2,63052	2,682 32	-0,76287	-0,0709	-0,02444	0,4601 3	0,420 58

Ede	0,44438	0,56906	0,437 58	-0,46931	-0,3602	-0,27374	1,2018 1	0,956 83
Elburg	-1,02448	-0,13409	0,126 71	-1,326	-0,07131	0,47416	1,0023 7	0,420 58
Epe	-0,37275	-0,14852	0,263 47	1,20803	-0,16139	0,47416	0,6595 6	1,188 15
Ermelo	-0,05867	0,46566	0,649 11	1,33222	-0,11	0,22486	-0,0945	0,517 84
Harderwijk	-0,27636	0,7141	0,798 66	1,48651	-0,25863	-0,27374	0,4705 5	0,822 77
Hatterem	-1,22025	-0,71737	1,217 66	1,32114	0,24766	0,47416	0,3708 4	0,249 72
Heerde	-1,32204	-0,35774	0,960 81	-0,25175	0,02474	0,97275	-0,2607	0,785 97
Heumen	0,12723	-1,60556	1,255 07	0,29324	0,12215	-0,02444	0,6263 2	0,920 03
Lingewaard	-1,13179	-1,17589	1,111 07	0,85581	-0,24574	0,72345	0,0612 6	0,383 78
Lochem	1,17795	-0,37453	0,258 69	0,37975	-0,15412	0,22486	1,1913 8	2,260 64
Maasdriel	2,29058	0,24901	0,446 88	0,733	-0,08854	0,47416	0,3604 1	0,822 77
Montferland	-1,01914	-0,3214	0,072 88	-0,3255	-0,20705	0,22486	0,8589 9	0,383 78
Neder-Betuwe	0,08296	0,80562	0,471 73	-0,86374	-0,08203	0,47416	2,5313 5	1,224 95
Nijkerk	0,7962	1,1987	0,788 76	0,21537	-0,22069	0,72345	0,9026 6	0,822 77
Nijmegen	0,16587	1,4989	1,246 48	0,48007	-0,39551	-2,51742	1,2350 4	2,029 32
Nunspeet	-0,10355	0,4094	0,394 34	0,48106	-0,12906	0,72345	1,1353 3	0,152 46
Oldebroek	-0,61823	-0,638	0,777 8	-0,55459	-0,07257	0,97275	1,0023 7	0,554 65
Oost Gelre Oude IJsselstreek	-0,76098	1,20661	1,287 17	-0,10269	-0,13859	0,97275	0,3604 1	0,383 78
	-1,04716	-0,00678	0,255 86	0,16909	-0,22973	-0,02444	0,8589 9	0,785 97

Overbetuwe	0,57608	0,17384	0,425 24	-1,04763	-0,24633	0,97275	0,3376	0,420 58
			-					
Putten	0,85125	-0,20694	0,387 11	-0,92531	-0,05871	0,97275	0,7364 6	0,152 46
			-					-
Renkum	0,73402	-0,83629	0,893 99	0,73535	-0,14733	-0,27374	-1,557	1,992 52
			-				-	-
Rheden	-0,31821	-0,09961	0,447 5	0,82842	-0,25276	-0,77234	0,9587 1	1,188 15
			-					-
Rozendaal	0,11085	-1,6932	2,109 06	-0,61526	6,90782	1,47135	0,6699 9	0,651 91
			-					
Scherpenzeel	-0,18955	-0,10348	0,377 97	1,2564	0,46068	0,72345	1,368	0,688 71
			1,098					1,090
Tiel	-0,58698	1,39111	8	-1,28288	-0,24839	-2,01883	-0,0945	89
			-				-	-
Voorst	0,39293	0,6245	0,851 96	0,69971	-0,07513	0,97275	0,1277 4	1,054 09
Wageningen	-1,57403	-0,05415	0,809 71	-0,81431	-0,28707	-3,51462	2,4648 7	2,163 38
West			0,797				0,5370	0,688
Betuwe	1,63738	1,03115	1	-0,10595	-0,24996	0,47416	3	71
West			-				-	
Maas en			0,859				0,7925	0,286
Waal	1,58228	-0,90262	5	1,43271	-0,0066	0,72345	1	52
			-				-	
Westervoort	-1,8747	-2,22977	2,275 39	-0,26718	0,07943	-0,77234	0,6263 2	0,018 4
			-				-	
Wijchen	-0,29607	-0,06362	0,019 51	0,82356	-0,22361	-0,02444	0,3271 7	0,018 4
			-				-	-
Winterswijk	-0,41062	-0,33434	0,297 2	-0,20124	-0,15822	-0,27374	0,5930 8	0,651 91
Zaltbommel	1,30003	0,97916	0,785 71	-2,22105	-0,13131	-0,02444	1,2018 1	1,090 89
			-				-	-
Zevenaar	-1,07869	-0,37194	0,325 2	0,37033	-0,25789	-0,52304	0,8257 5	0,517 84
			-					-
Zutphen	0,30444	-0,48893	0,207 61	0,8118	-0,27686	-1,27093	-0,6928	0,383 78

Peripherality Indexes

Gemeente	Peripherality (elke variabelen weeft 1)	Peripherality (leeftijd variabelen samen wegen 1)	peripherality (componenten en migratie wegen 1))
Aalten	-2,03807	-1,73245	-1,90505
Apeldoorn	1,6763	1,61353	2,05864
Arnhem	1,14496	-0,00526	1,53406
Barneveld	7,36497	5,48682	7,64518
Berg en Dal	-4,10919	-3,053485	-3,90803
Berkelland	-3,15997	-2,22005	-2,91729
Beuningen	-3,80975	-3,823215	-3,71166
Bronckhorst	-1,87981	-0,522195	-1,70424
Brummen	-3,29377	-2,12118	-3,26322
Buren	0,77997	0,616375	0,8697
Culemborg	1,72025	1,29019	1,86307
Doesburg	-6,78521	-5,11183	-7,01455
Doetinchem	1,79335	1,7472	2,09005
Druten	-0,35974	-0,45686	-0,36612
Duiven	4,14705	4,166825	4,21795
Ede	2,50641	1,42709	2,86661
Elburg	-0,78548	-1,496955	-0,71417
Epe	-1,11165	-0,187795	-0,95026
Ermelo	1,89084	2,19701	2,00084
Harderwijk	3,48386	2,8372	3,74249
Hatter	-0,9912	-1,05176	-1,23886
Heerde	-2,94152	-2,418185	-2,96626
Heumen	-3,8888	-3,115625	-4,01095
Lingewaard	-2,53027	-2,30775	-2,28453
Lochem	-2,4568	-0,73079	-2,30268
Maasdiel	3,67369	3,44251	3,76223
Montferland	-2,96388	-2,342495	-2,75683
Neder-			
Betuwe	4,645	2,76685	4,72703
Nijkerk	5,22722	4,364505	5,44791
Nijmegen	3,74275	2,11057	4,13826
Nunspeet	3,06343	2,419535	3,19249
Oldebroek	-0,13142	-0,90993	-0,05885
Oost Gelre	1,72008	2,092175	1,85867
Oude			
IJsselstreek	-2,52812	-1,70564	-2,29839
Overbetuwe	1,61213	1,23304	1,85846
Putten	1,13485	0,69039	1,19356
Renkum	-4,2315	-2,45674	-4,08417
Rheden	-3,20886	-2,13543	-2,9561
Rozendaal	4,09058	4,08154	-2,81724
Scherpenzeel	3,82624	2,797885	3,36556
Tiel	-0,65078	-1,148975	-0,40239
Voorst	2,28489	2,875805	2,36002
Wageningen	-0,80622	-3,120345	-0,51915

West			
Betuwe	4,80962	4,19675	5,05958
West Maas			
en Waal	1,46373	1,716725	1,47033
Westervoort	-7,94787	-7,64391	-8,0273
Wijchen	-0,11246	0,041925	0,11115
Winterswijk	-2,32595	-1,703455	-2,16773
Zaltbommel	2,9808	1,83445	3,11211
Zevenaar	-3,53002	-2,858225	-3,27213
Zutphen	-2,20467	-1,66638	-1,92781

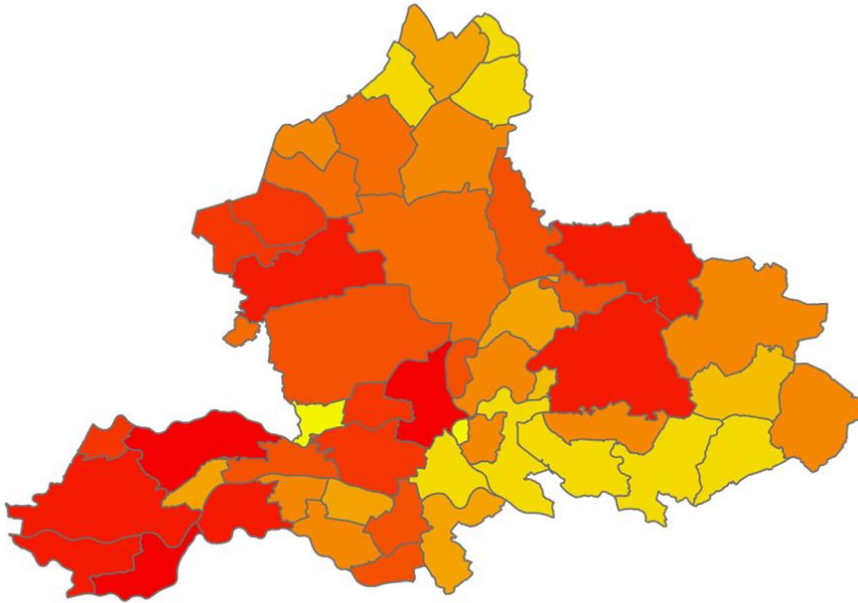
Components

Gemeente	Demografie (component)	economisch 1 (component)	Economisch 2 (component)
Aalten	-0,61124	-1,0024	-0,47764
Apeldoorn	0,12554	3,57095	-0,86964
Arnhem	2,30044	3,85283	-0,55454
Barneveld	3,7563	2,56669	2,09898
Berg en Dal	-2,11141	-1,55919	-0,57445
Berkelland	-1,87984	-0,87	0,11988
Beuningen	0,02693	-2,1509	-0,80297
Bronckhorst	-2,71523	-1,10284	2,45881
Brummen	-2,34518	-1,38547	-0,40478
Buren	0,32719	-2,20187	2,77759
Culemborg	0,86012	0,22991	0,18885
Doesburg	-3,34676	-1,82471	-2,08417
Doetinchem	0,0923	2,41327	-0,78331
Druten	0,19424	-1,30272	0,04727
Duiven	-0,03955	5,31284	-0,29247
Ede	2,15864	1,00664	0,17064
Elburg	1,42295	-0,2608	-0,55032
Epe	-1,84771	-0,41199	0,10141
Ermelo	-0,61234	1,11477	0,16619
Harderwijk	1,29332	1,51276	-0,5501
Hatterem	0,12112	-1,93503	-0,74609
Heerde	-1,04667	-1,31855	-0,34929
Heumen	-1,54635	-2,86063	0,10279
Lingewaard	-0,44504	-2,28696	-0,40834
Lochem	-3,45202	-0,63322	1,40281
Maasdiel	0,46236	-0,19787	2,76474
Montferland	-1,24277	-0,39428	-0,79428
Neder-Betuwe	3,7563	1,27735	0,55712
Nijkerk	1,72543	1,98746	1,51965
Nijmegen	3,26436	2,74538	-2,35155
Nunspeet	1,28779	0,80374	0,6199
Oldebroek	1,55702	-1,4158	0,35452
Oost Gelre	-0,74419	2,49378	0,21177
Oude IJsselstreek	-1,64496	0,24908	-1,0716
Overbetuwe	0,75818	0,59908	1,54883
Putten	0,88892	-0,59405	1,824
Renkum	-3,54952	-1,73028	0,46028
Rheden	-2,14686	-0,54711	-1,09055
Rozendaal	0,01808	-3,80226	1,5822
Scherpenzeel	2,05671	-0,48145	0,5339
Tiel	0,99639	2,48991	-2,60581
Voorst	-1,18183	1,47646	1,36568
Wageningen	4,62825	0,75556	-5,08865

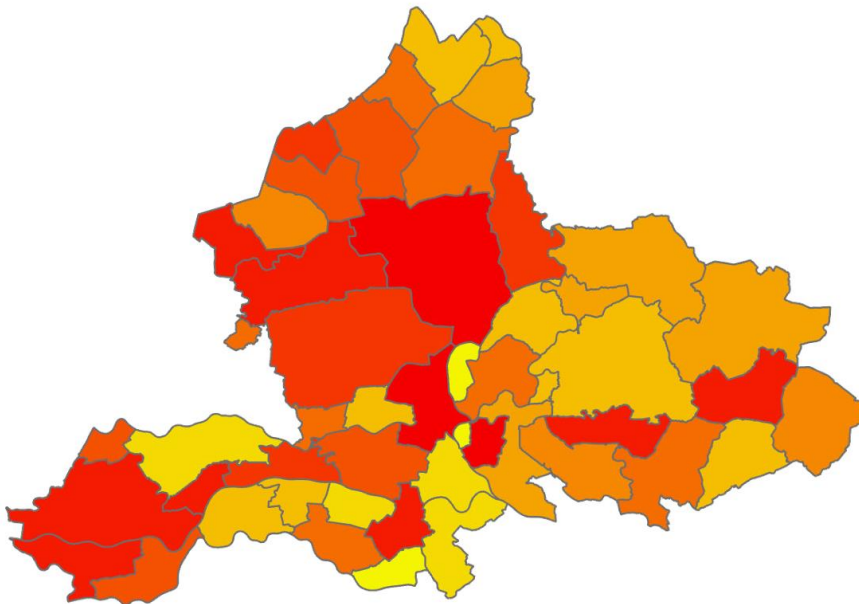
West Betuwe	1,22574	1,82825	2,11154
West Maas en Waal	-0,50599	-1,76212	2,30573
Westervoort	-0,60792	-4,50516	-2,64704
Wijchen	-0,30877	-0,08313	-0,32051
Winterswijk	-1,24499	-0,03714	-0,68436
Zaltbommel	2,2927	1,76487	1,27559
Zevenaar	-1,34359	-0,69714	-1,60173
Zutphen	-1,07658	-0,69654	-0,96649

V. ArcGIS maps

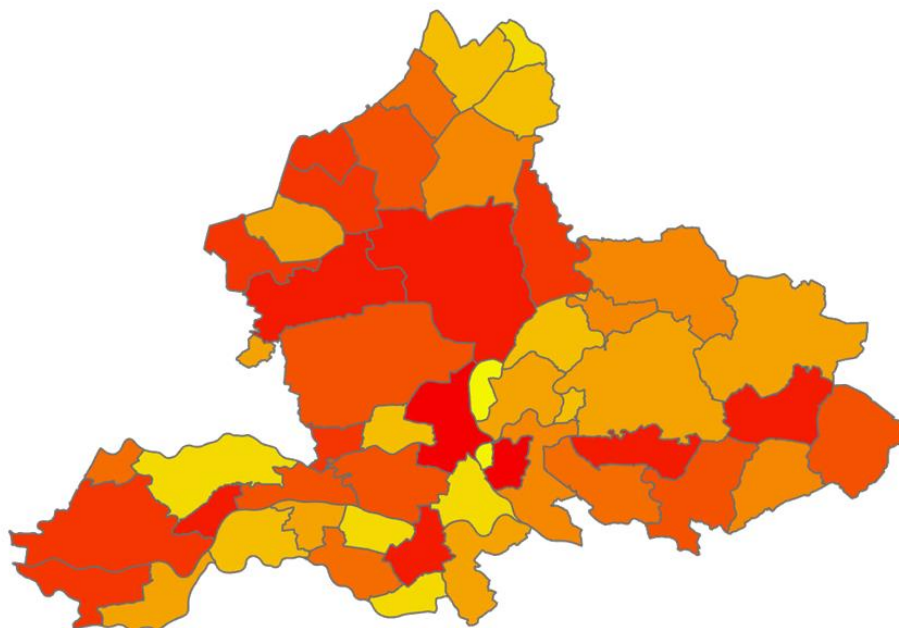
Business locations



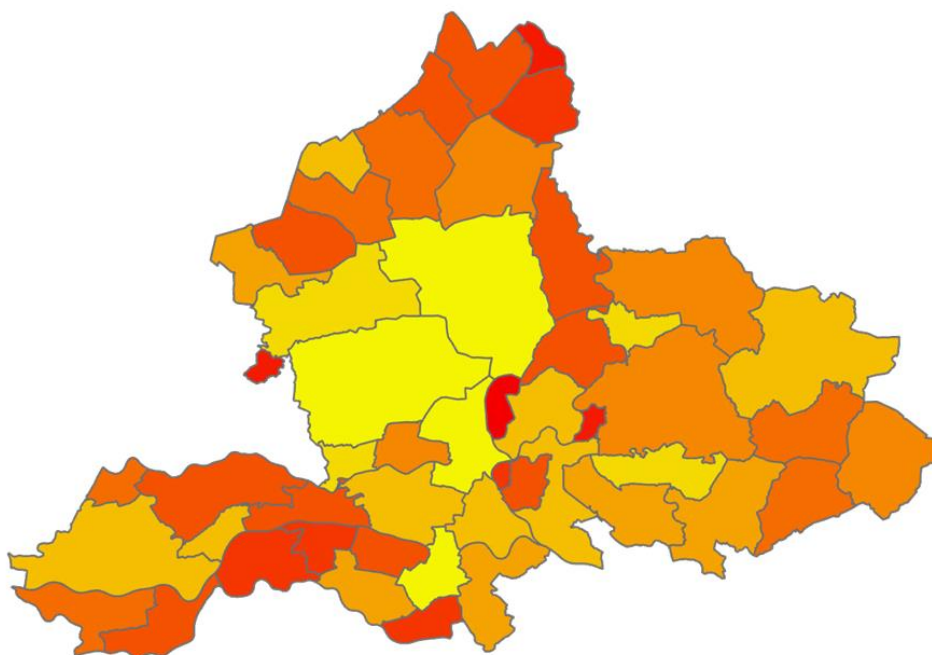
Surplus value



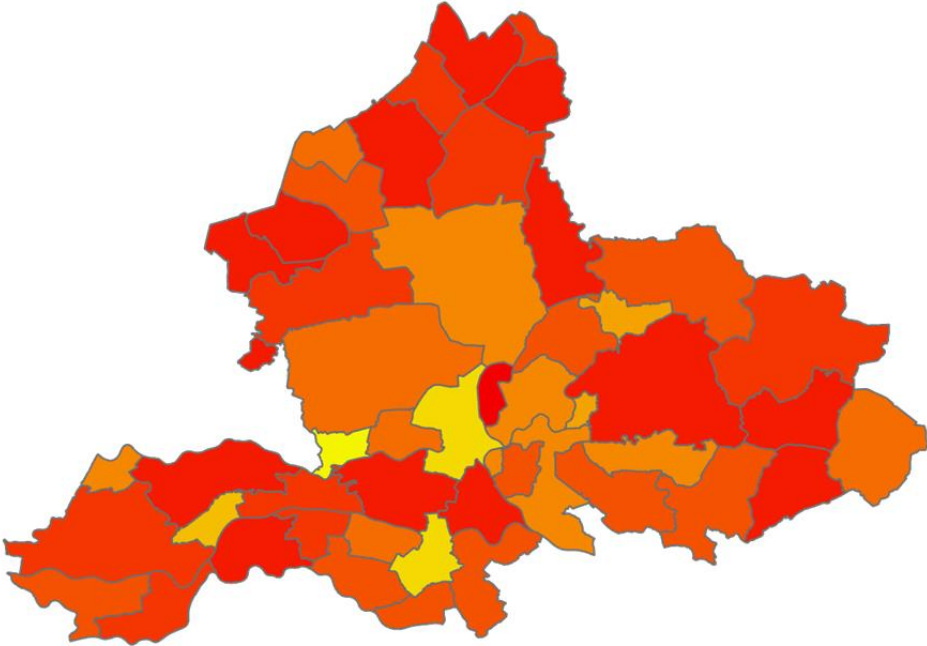
Number of jobs



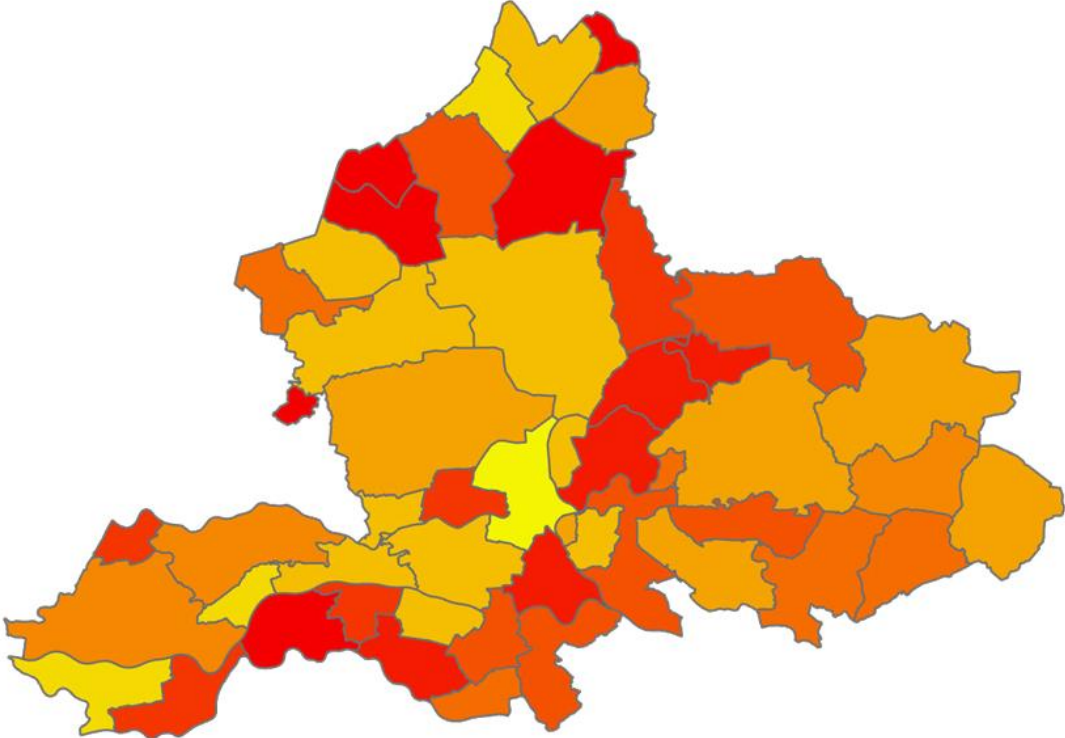
Disposable income



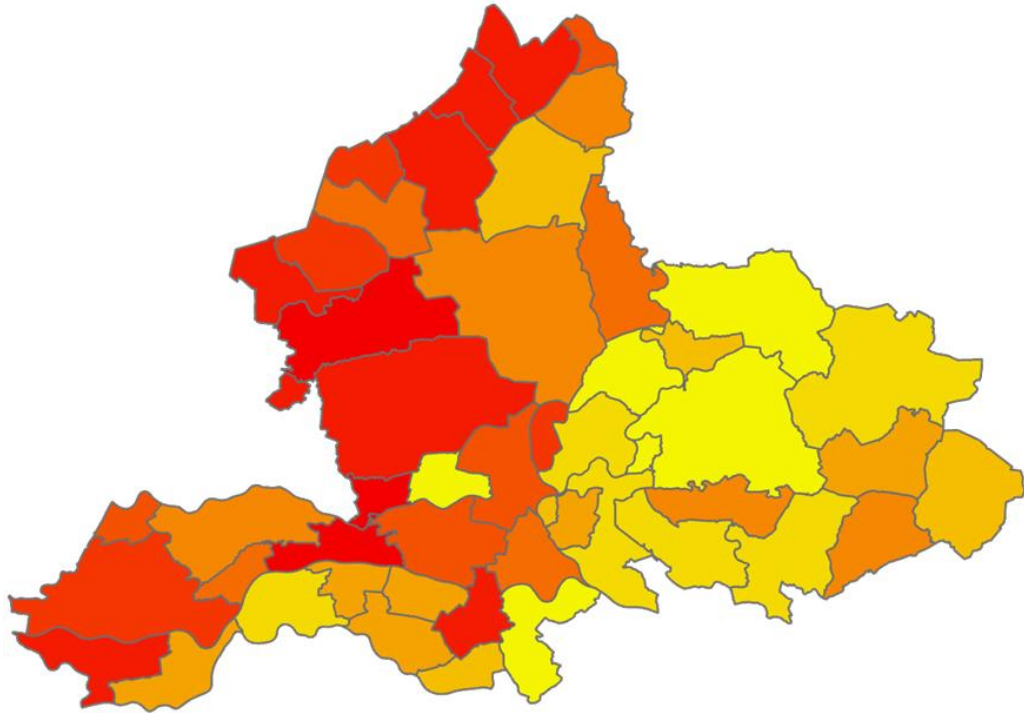
Unemployment



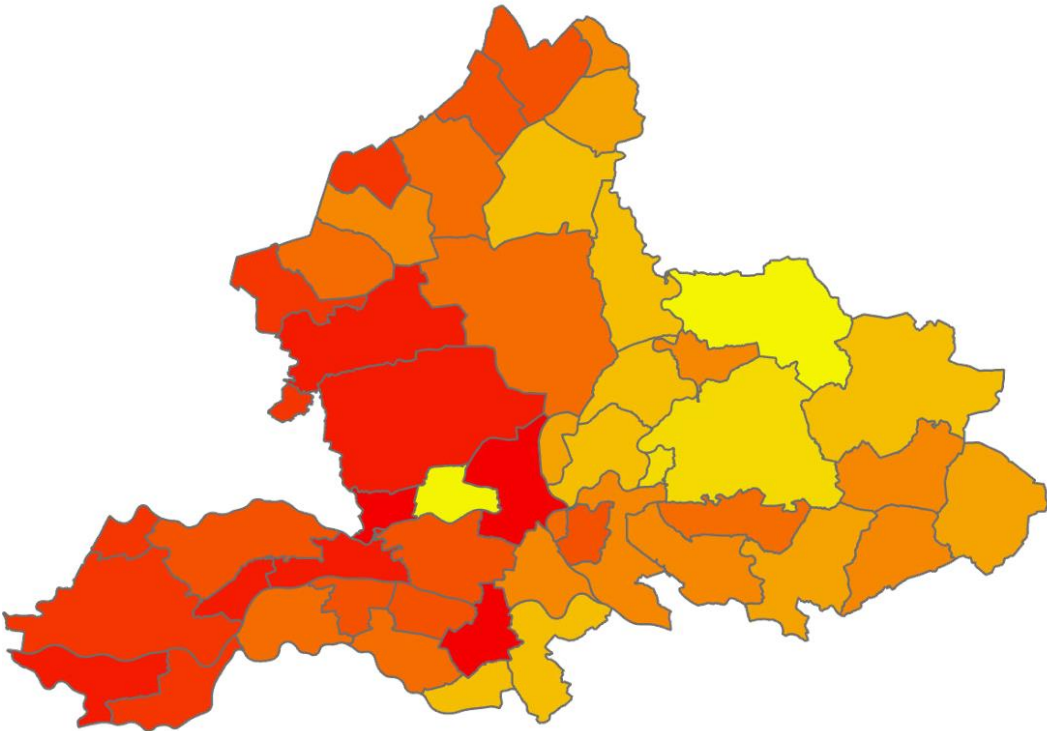
Net migration



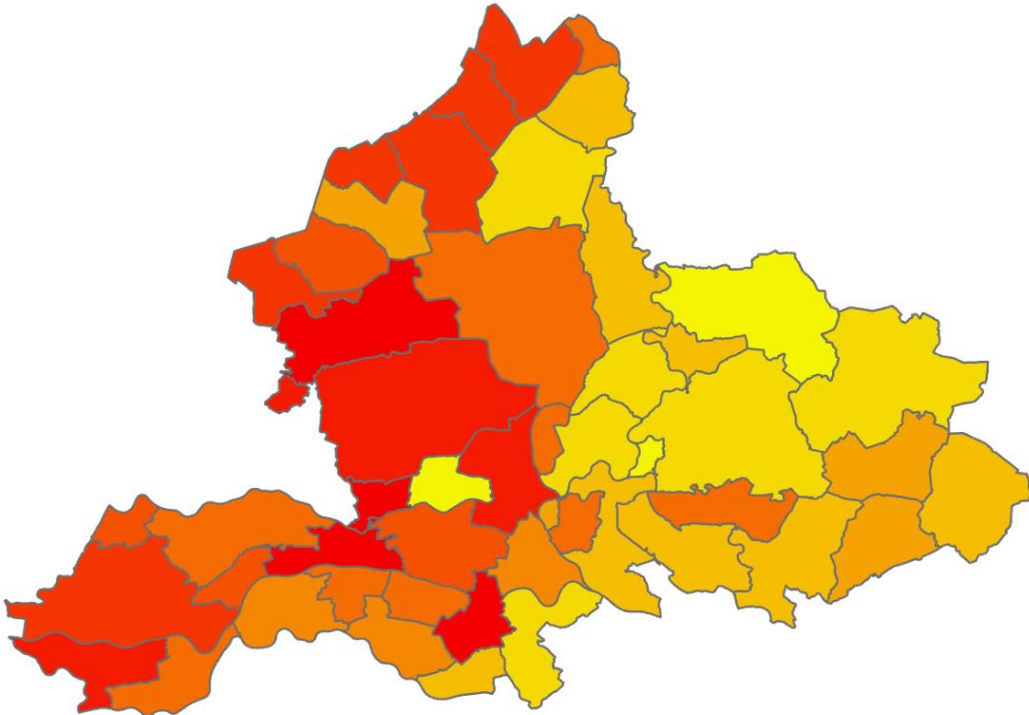
Inhabitants below the age of 25



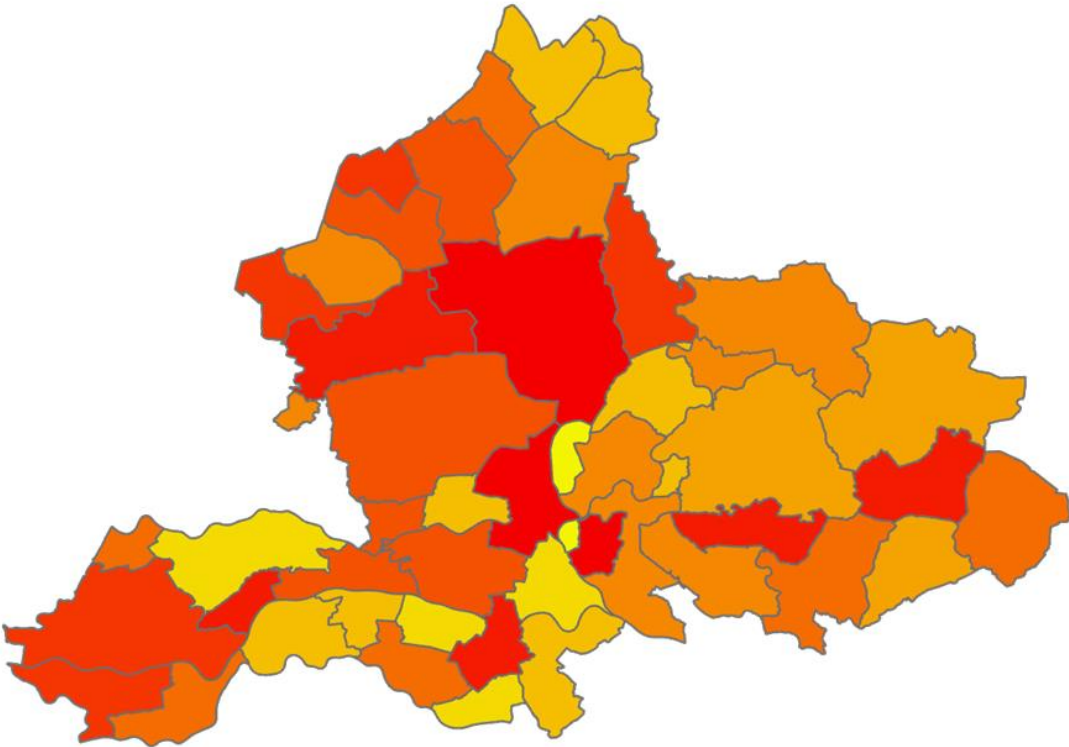
Dependency ratio



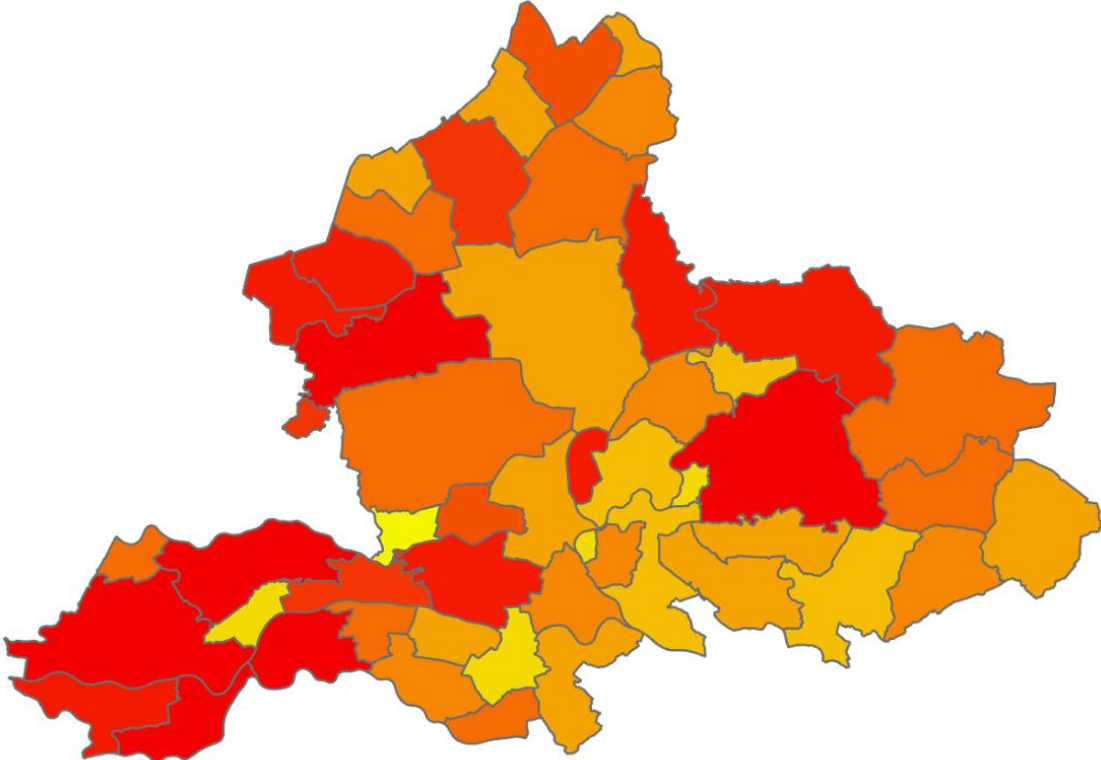
Component demographics



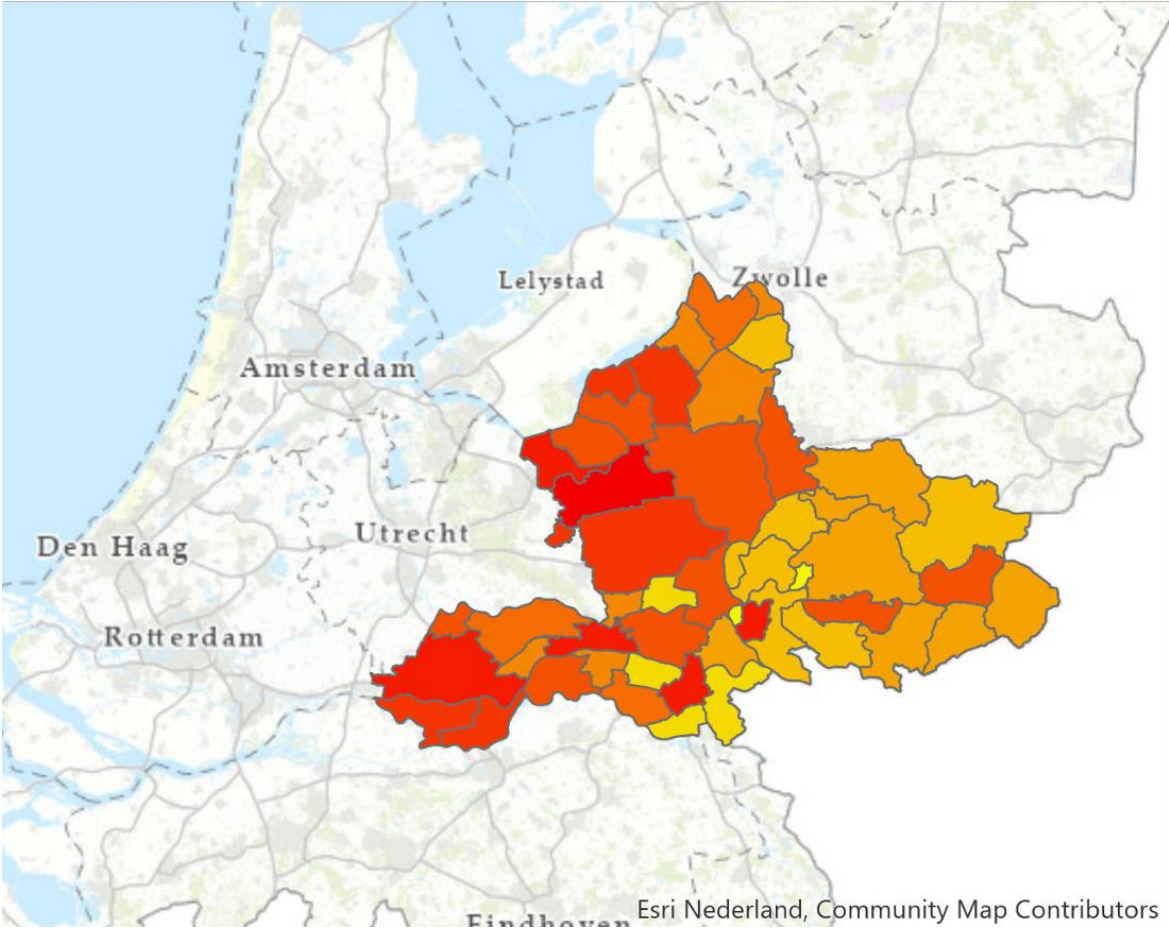
Component economic power



Component economy/living environment



Peripherality index based on components and net migration



VI. Significant spatial autocorrelation tables (ArcGIS)

Peripherality index using components

Moran's I index	0,289737
Expected Index	-0,020000
Variance	0,012361
Z-score	2,785919
P-value	0,005338

Business location

Moran's I index	0,390156
Expected Index	-0,020000
Variance	0,012371
Z-score	3,687602
P-value	0,000226

Inhabitants below 25

Moran's I index	0,324914
Expected Index	-0,020000
Variance	0,012174
Z-score	3,126026
P-value	0,001772

Grey demographic pressure

Moran's I index	0,187187
Expected Index	-0,020000
Variance	0,012339
Z-score	1,865211
P-value	0,062152