Space for Scale ups

Understanding how spatial dynamics shape the distribution of scale ups in the Netherlands

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Colofon

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Preface

The interest and motivation to do my thesis on this topic of scale-ups, comes primarily from my broader fascination of geopolitics and the importance of strategic autonomy and competitiveness of countries. At first glance, this may seem far removed from the subject of scale-ups. However, this connection became clear largely thanks to my supervisor. In fact, the relationship is not as distant as it might initially appear. Scale-ups are innovative, fast-growing companies that play a crucial role in the Dutch economy. During my research, I discovered that a significant share of employment is concentrated within these firms. Although this was not my original topic of choice, I am very pleased that I ultimately pursued this subject.

This thesis would not have been possible without the support of my supervisors, whom I would like to thank sincerely. First and foremost, I am grateful to Karel Van den Berghe, whose boundless enthusiasm for the topic prevented me from giving up at earlier stages. Whenever I questioned the relevance of my work, he consistently reminded me of its importance and societal value. I would also like to thank my second supervisor, Peter Pelzer, whom I initially approached because my research proposal had a stronger urban design focus. However his critical questions, particularly regarding the research framework and its translation towards future implications, proved invaluable. Finally, I would like to thank Sjoerd Hardeman, my supervisor at TNO, who greatly supported the translation of theory into practice. His economic perspective on the spatial dynamics of scale-ups and their policy implications significantly increased my enthusiasm for the applied relevance of this research.

The combination of these three supervisors, each from different academic backgrounds, urban planning, spatial planning and social geography, has resulted in a broad and integrated thesis. Although I studied at a faculty of architecture, complex societal challenges require interdisciplinary perspectives to arrive at comprehensive insights. I hope you enjoy reading this thesis and that its findings may be useful within your own field.

Peter Baarda

Jan 2026

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Executive summary

In recent years, European and Dutch policy documents have increasingly emphasised the need to strengthen innovation capacity and reduce strategic dependence. Reports by Letta (2024) and Draghi (2024), the European Commission's Competitiveness Compass (2025), and recent Dutch policy initiatives all underline the importance of creating conditions in which innovative firms can grow and scale. Within this policy agenda, the Netherlands faces the challenge of reinforcing its innovation-driven earning capacity under conditions of severe spatial scarcity.

Scale-ups are high-growth firms that have moved beyond the start-up phase and exhibit sustained expansion in employment or turnover. Although they form a relatively small share of all firms, they play a important role in innovation, productivity growth and structural economic change. In the Netherlands, scale-ups are active across a wide range of sectors and regions, but their geographical distribution is uneven.

This thesis investigates the spatial dynamics underlying the geographical distribution of scale-ups in the Netherlands over time. Empirical data reveal clear regional and sectoral differences, indicating that scale-up locations are not random. The central research question addressed is:

"What spatial dynamics explain the geographical distribution of scale-ups in the Netherlands over time?"

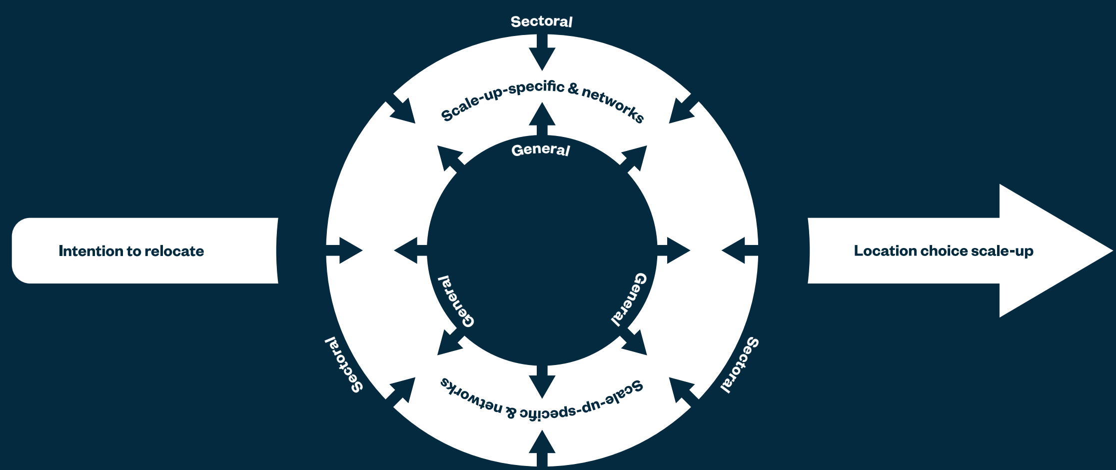
To answer this question, the study adopts an exploratory, data-driven approach that combines longitudinal microdata with GIS-based spatial analysis. Scale-ups are conceptualised as spatial actors whose locational behaviour is shaped by infrastructure, labour markets, sectoral embeddedness, networks and policy environments. By doing so, the thesis provides empirical insight into the relationship between scale-ups and spatial conditions and contributes to better aligning innovation policy, regional economic development and spatial planning in a context of land scarcity.

The research follows an exploratory and retroductive methodological stance, reflecting the limited existing knowledge on the spatial behaviour of scale-ups. Rather than testing predefined hypotheses, the analysis identifies patterns in the data and infers plausible underlying spatial dynamics. The core of the study is a longitudinal firm-level dataset derived from the LISA register, covering the period 2013–2022 and including annual observations for Dutch firms with two or more employees. Scale-ups are identified based on sustained employment growth over a three-year period. GIS-based spatial analysis and descriptive statistical methods are used to examine geographical distribution and regional and sectoral variation. A small number of qualitative interviews with scale-up founders and policy professionals complement the quantitative analysis by supporting contextual interpretation rather than serving as formal empirical evidence.

Over the period 2013–2022, the empirical analysis identifies the following key spatial patterns in the distribution of Dutch scale-ups:

- Spatial clustering operates primarily at a regional scale. Municipalities with high scale-up activity are typically located near other high-performing municipalities, indicating that scale-up dynamics are embedded within broader regional innovation systems rather than isolated local contexts.
- The spatial distribution of scale-ups is dynamic rather than static. While the traditional economic core remains dominant in absolute numbers, scale-up activity shows gradual spatial diffusion.
- Parts of South Holland exhibit a statistically significant decline in scale-up activity over the study period, while several eastern provinces display upward trends.
- Sectoral characteristics strongly condition spatial patterns. Showing a strong achoring effect on location choice for specific sectors.
- In contrast, sectors such as horticulture, logistics and Life Sciences & Health display more place-bound patterns linked to sector-specific infrastructures, market structures or regulatory conditions.
- Socio-economic characteristics play a decisive role. Scale-up activity correlates strongly with education levels and is associated with younger populations and higher urban density.
- Human capital and urban environments that support interaction and accessibility appear more influential than sheer population size, while real estate affordability functions as a supporting rather than dominant factor.
- Spatial requirements differ markedly by activity type. Office-based scale-ups operate in premises comparable in size to other established firms, whereas space-intensive scale-ups occupy substantially larger buildings (median 1,314 m² versus 835 m²).
- Business parks emerge as key spatial environments for growth: 56% of scale-ups are located on business parks, compared to 23% of firms overall.

The emperical findings indicate that the geographical distribution of scale-ups in the Netherlands cannot be explained by a single dominant spatial logic. Instead, scale-up geography emerges from the interaction between spatial shifting and spatial anchoring processes that operate simultaneously across multiple scales. The figure below shows this interaction by integrating general spatial dynamics, scale-up-specific boundary conditions, sectoral anchoring and network effects into a single conceptual framework.



At the most general level, scale-up activity responds to broader spatial dynamics such as land availability, affordability and the evolution of Dutch urban regions. These dynamics help explain why scale-up activity gradually extends beyond the traditional economic core. Over time, scale-ups increasingly appear in regions offering more space, lower pressure on land and suitable infrastructure, while the Randstad remains important but no longer functions as the exclusive centre of scale-up development.

At the same time, scale-ups are subject to clear boundary conditions that determine whether locations are feasible at all. Across sectors, the availability of a young and highly educated workforce emerges as the most decisive factor, alongside urban environments that support interaction, accessibility and amenities. Physical conditions further constrain location choice, particularly for space-intensive sectors that require larger premises, specific zoning categories and appropriate environmental conditions. These boundary conditions explain why many locations remain structurally excluded from scale-up activity, regardless of policy ambition.

Sectoral dynamics introduce a strong anchoring force within this shifting landscape. Scale-ups tend to concentrate in locations that align with sector-specific requirements related to labour profiles, knowledge bases, infrastructure or spatial footprint. As a result, certain regions continue to function as stable anchors for specific sectors, even as scale-up activity becomes more geographically dispersed overall. This explains why spatial change occurs through gradual redistribution rather than a complete reconfiguration of economic geography.

This thesis therefor demonstrates that scale-up policy and spatial policy are fundamentally interdependent. It shows that the geography of Dutch scale-ups is shaped by an interplay of spatial dynamics yet remains inherently organic, reflecting both the shifting demands of scale ups and the anchoring effect of sectoral and regional environments. Understanding this dual logic strengthens our insight into how economic growth and spatial development interact. The ultimate goal is to see policy makers adapt this framework and add to the competitiveness of Europe though scale-ups and there innovations.

Abstract

Europe is pushing for strategic autonomy and long-term competitiveness. Scale-ups, high-growth firms that have moved beyond the start-up phase, are central to innovation and employment, yet their spatial dynamics remain poorly understood. This thesis examines what spatial dynamics explain the geographical distribution of scale-ups in the Netherlands over time. It develops an exploratory, retroductive research design that combines firm-level LISA data (2013–2022) with GIS-based spatial statistics (inhomogeneous Ripley's K, Global Moran's I and Getis–Ord Gi*) and sectoral specialisation indicators at municipal and COROP levels. Scale-ups are operationalised using OECD high-growth criteria. The results reveal a structured yet evolving geography. Nationally hotspot analysis and trend analysis show a gradual eastward shift, with growing concentrations in outer Randstad areas and eastern provinces and relative decline in parts of South Holland. While sectoral factors have an anchoring effect on scale ups binding them to certain regions. Four interacting mechanisms jointly shape these patterns: general location conditions (especially land availability and affordability), scale-up-specific factors, sector-specific spatial requirements and more modest networking and clustering effects. Within this configuration, scale-up-specific factors, particularly the residential geographies of founders and employees, emerge as the strongest drivers of location and many scale-ups operate from business parks rather than iconic inner-city ecosystems. The thesis provides the first national, longitudinal, data-driven overview of Dutch scale-ups and outlines an initial mechanism-based framework linking scale-up growth to spatial conditions. It shows that policy can enable, but not tightly steer, scale-up geography, underscoring the need to align economic and spatial planning when reserving space for future growth.

Keywords | Scale-ups, spatial, dynamics, competitiveness, Netherlands

1 Introduction

Since 2008, the openness of the global economy has been in decline, raising concerns about increasing 'strategic dependence' and the vulnerability of European economies (Van Bergeijk, 2022). In response to growing geopolitical instability, European policymakers argue that the continent must strengthen its own economic foundations. Letta (2024) argues that Europe must place greater emphasis on strengthening its own economic foundations or risk becoming irrelevant in the future. Similarly, Draghi's report (2024) cautions that the EU can no longer rely on open global trade systems and shouldn't lose their innovation capacity. Europe must take decisive action now, or it will lose its engines of growth. The response of the EU is highlighted in the Competitiveness Compass: "Europe must be the place where tomorrow's technologies, services and clean products are invented, manufactured and marketed, as we stay the course to climate neutrality" (European Commission, 2025b, p. 2). Reflecting this ambition on the 28th of May the European commission announced plans to make Europe the start-up and scale-up powerhouse (European Commission, 2025a).

These geopolitical developments place direct pressure on the Netherlands to reinforce its innovation-driven earning capacity (verdienvermogen) (TNO, 2022). The Dutch government aims to invest 3% of GDP in R&D by 2030 (Rijksoverheid, 2024). However, recent research shows that funding alone is insufficient. TNO Vector (2025) stresses the importance of reducing the innovation gap in light of the Draghi report and highlights the spatial dimension of innovation policy. Spatial conditions and the allocation of land increasingly determine whether innovative firms can grow (van Dijk, 2025). This challenge is amplified by the structural scarcity of space in the Netherlands, where innovation competes directly with housing, energy systems, nitrogen policies, and a wide range of other spatial claims.

Research shows that innovation takes place in mostly scale ups (European Investment Bank, 2024; McKinsey & Company, 2022). Ambitious entrepreneurship drives stronger economic growth, young firms create more jobs and high-growth firms help shift jobs to emerging industries (Stam & van de Ven, 2019). Scale ups are high-growth firms that move beyond the start-up phase. They are seen as crucial engines of innovation, productivity and employment (Adriaansens, 2023; Wennink, 2025). Scale-ups tend to be more innovative because they operate in dynamic stages of the business life cycle (Cséfalvay, 2024; Matejun & Mikoláš, 2017). They play a crucial role due to their diffusion of new products and technologies and their importance for economic competitiveness (Felzensztein & Bagheri, 2024; Strengers et al., 2022). Recent letters to Parliament emphasise the need to strengthen the ecosystem for start-ups and scale-ups (Beljaarts, 2025; Karremans, 2025). Despite increasing recognition of the economic importance of scale-ups in Dutch policy, only 21% of Dutch startups successfully grow into scale-ups (Adriaansens, 2023). Several years ago, State Secretary Keijzer (2019) already highlighted this issue, stating: "In this [a previous letter to the government], I indicated that the Netherlands has a relatively high number of start-ups, but relatively few grow into scale-ups and subsequently into large companies with societal and economic impact" (p. 3, translated).

Although scale-ups are widely recognised as crucial economic actors, academic research on their spatial dynamics remains limited. Existing policy documents acknowledge regional differences in innovation capacity, but do not systematically analyse where scale-ups emerge, how their growth relates to regional conditions, or what spatial mechanisms may explain their distribution. This study therefore investigates the question: "*What spatial dynamics explain the geographical distribution of scale-ups in the Netherlands over time?*".

The data show clear spatial differences across regions, sectors and time, indicating that these patterns are unlikely to be random. Understanding these differences matters, as they can determine whether certain forms of economic activity need support. By analysing these patterns, the thesis contributes to the broader societal debate on the allocation of scarce space, regional economic development, sectoral specialisation and European scale-up policy.

This study provides the first exploratory, data-driven analysis of the geographical distribution of scale-ups in the Netherlands over time. It uses a mixed-method approach, combining longitudinal LISA microdata with GIS-based spatial analysis and theoretical interpretation. The thesis develops an initial conceptualisation of scale-ups as spatial actors and investigates potential mechanisms influencing their locational behaviour, including infrastructure, labour markets, networks, sectoral embeddedness and policy environments. Although exploratory, the study offers the first structured empirical evidence on the interaction between spatial factors, sectoral characteristics and regional conditions in relation to scale-ups.

The societal relevance of this research lies in demonstrating that economic development and spatial dynamics are inseparable. In a context of land scarcity and competing spatial claims, policymakers increasingly need to understand where scale-ups emerge, what environments they require and how these conditions evolve. By identifying the dynamics within the Dutch context, this thesis contributes to the understanding of spatial dynamics of scale-ups and economic development strategies that enable scale-ups to grow within spatial limits. It also provides first conceptual building blocks for linking spatial conditions to scale-up development, supporting municipal, regional, national and European efforts to strengthen innovation capacity and contribute to the Netherlands' long-term competitivenes.

1.1 Chapter outline

This thesis begins by positioning scale-ups within the theoretical background where it defines scale-ups, reviews spatial economic theory and clustering dynamics and outlines the policy context, identifying key gaps. After which the framework will be introduced. The methodology chapter explains the explorative, retroductive research design, detailing the use of longitudinal LISA data, GIS-based spatial analysis, composed variables and ethical considerations. The results chapter presents descriptive statistics, maps the geographical distribution of scale-ups over time and examines spatial, sectoral and clustering patterns. After which they will be synthesised into the framework and two illustrative examples will be given. The discussion and conclusion interpret these findings, connect them to theory and policy, reflect on limitations and propose directions for future research.

2 Theoretical background

Europe must strengthen its innovation capacity to ensure long-term competitiveness and strategic autonomy (Draghi, 2024; Letta, 2024). Scale-ups, high-growth firms that move beyond the start-up phase, are seen as crucial engines of innovation, productivity and employment (Adriaansens, 2023). Their rapid expansion makes them vital actors in regional economic development and are often mentioned in relation to economic development and increasing the competitiveness of the Dutch economy (Beljaarts, 2025; Karremans, 2025; Keijzer, 2019).

Several terms are currently used to define a scale-up, often interchangeably with older start-ups, Small Medium Enterprises (SMEs) or gazelles, even though these comparisons are not entirely accurate (Coad et al., 2024; Coviello, 2019). For this research, it is essential to establish a clear and consistent working definition of a scale-up to guide the methodology. This literature section draws on academic and grey literature to formulate a working definition of scale-ups in the Netherlands.

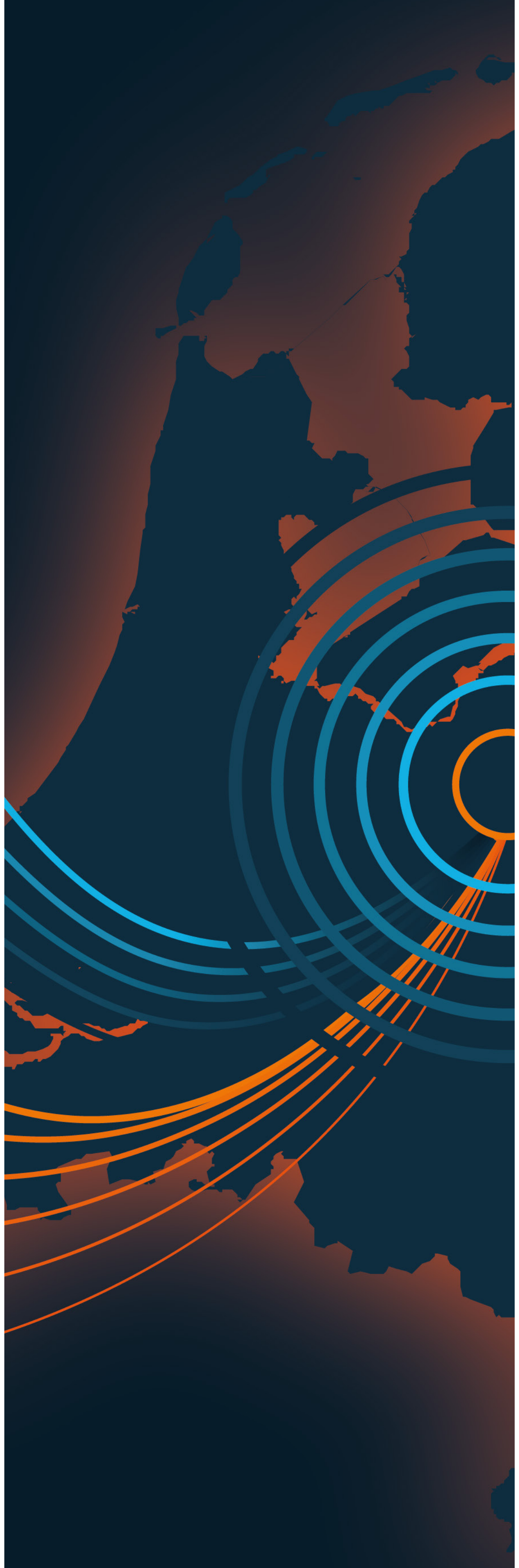
2.1 Definition scale-up

Scale-ups are commonly understood as firms in an intermediate phase of organisational development, characterised by rapid growth aimed at achieving economies of scale (Piaskowska et al., 2021). The OECD (2010) defines scale-ups as firms with at least 10 employees and an average annual growth rate of over 20% in employment or turnover over three years. Smaller firms can also qualify if they add at least eight employees in the same period, this definition is also used by other academics (Crnogaj & Rus, 2023; El-Dardiry & Vogt, 2022). Jansen et al. (2023) classify scale-ups within the broader category of High-Growth Firms (HGFs), they state young firms up to 10 years old that have grown to 50 or more employees. However, both definition does not fully capture the complexity of what constitutes a scale-up.

Coviello (2019) stresses that scale-ups are not synonymous with HGFs, as growth is only one aspect. The distinction depends significantly on the organisational phase and strategic orientation. Coad et al. (2024) offers there for a more nuanced framework, identifying five key characteristics of scale-ups:

1. they exist across all sectors,
2. they invest heavily in marketing and sales,
3. they benefit from low marginal production costs,
4. they are young but not in the nascent start-up stage and
5. they adopt the HGF/OECD growth criteria as a baseline but go beyond them.

In another study, which excluded the research from Coad et al. (2024), Coviello et al. (2024) conducted a comprehensive literature review, distinguishing between scaling, scalability and scale-up. They conceptualise scale-up as an organisational phase rather than a pure function of growth, suggesting that not all scale-ups are defined solely by their expansion metrics. Duruflé et al. (2017) also define scale-ups less focused on growth and more focused on stage. They define them as ventures that have moved beyond the exploratory phase,



established a viable product-market fit and are entering a phase of rapid growth and market expansion. Similarly, Hamilton and Ng (2025) argue that although scaling involves growth, not all growth equates to scaling. They define a scale-up as a phase in which a firm actively pursues returns to scale, transitioning from experimentation to standardisation, increasing capital intensity and shedding non-core assets. This metamorphosis marks a strategic shift beyond just rapid expansion. A key distinction lies in the scalability of the business model, scale-ups achieve growth through economies of scale, meaning they increase revenue faster than costs by replicating processes efficiently (Monteiro, 2019). Monteiro (2019) highlights the limitations of using the OECD (2010) definition of HGFs to capture scale-ups, noting that while all scale-ups may meet HGF criteria, not all HGFs qualify as scale-ups.

In addition to academic literature, grey literature offers alternative perspectives on scale-ups. The national government often mentions scale-ups in the same breath as start-ups, referring to them as young, innovative (technology) companies. However, their definition is qualitative in nature: a scale-up is described as a rapidly growing company with a validated business model (Beljaarts, 2025). McKinsey & Company (2022) define scale-ups as entrepreneurial ventures that have achieved product–market fit and are experiencing exponential growth. This is the same focus on growth which is supported by other grey literature. They define them as organisations that grew in the most recent 3 years to at least 30 FTEs, to get a full company structure (ScaleUpNation, 2020). What all these three have in common is, that the focus is on growth.

The European Investment Bank (2024) adopts a valuation-based approach, categorising scale-ups as firms valued between $500 million and $10 billion. Based on their definition, only 16 to 23 such firms existed in the Netherlands between 2013 and 2023, highlighting the challenges of defining this way. A valuation based approach would leave out scale-ups that would be important for the innovation in the Netherlands. When talking about valuation this is important for venture-backed scale-ups, they are typically those that have progressed beyond seed and series A funding, entering Series B or later stages (Duruflé et al., 2017). This also directly links to one of the problems in Europe, which is the lack of funding for Scale-Ups from venture capital (VC) (Quas et al., 2022). However, it's important to note that VC is not always essential for a company to scale. Some businesses are spin-offs of larger companies, grow by reinvesting profits from a previously successful venture or by using that success as collateral to secure a new loan.

In addition to the qualitative and financial definitions, CBS (2023) adopts a more formal, data-driven approach. They made this database in combination with Erasmus Centre for Entrepreneurship. They define a scale-up as a firm that had at least 10 full-time equivalent (FTE) employees in year three, was founded before that year and achieved average annual employment growth of at least 20% over the subsequent three years.

As stated the term scale-up is used inconsistently in the literature, often overlapping with related terms. Definitions of these terms are provided in Table 1. It is important to note that these definitions vary by region and often involve unclear or conflicting criteria. For this study, the definitions as in Table 1 are being used.

2.1.1 Business lifecycle

In the previous subsection, it was noted that there is an ongoing debate about whether the focus should be on growth itself or on the specific phase in which a company finds itself (Coad et al., 2024; Coviello et al., 2024; Jansen et al., 2023; Piaskowska et al., 2021). The business life cycle, or product life cycle, has been described by Churchill and Lewis (1983) who distinguish four key phases through which a company typically progresses, which are visualised in Figure 1.

Scale-ups occupy a distinct phase in the business lifecycle, situated between the uncertainty of early-stage start-ups and the stability of mature enterprises. The start-up phase is the initial stage in which the entrepreneur plays a pivotal role in defining the business model. This phase is characterised by high levels of uncertainty. A company only becomes a scale-up after it reaches a "trigger point" and a "turning point", entering a period of accelerated growth beyond the initial phase, including the challenging "valley of death" (Monteiro, 2019). With increased spending comes a greater need for funding. In contrast to start-ups, scale-ups demonstrate greater structural stability and enjoy higher levels of customer confidence. They are further along in their development, generate more revenue and depend on series B funding and beyond (Duruflé et al., 2017). The funding doesn't have to be venture capital it could also be funding from a previous enterprise or own funding. The biggest challenges scale-ups face in there phase in the business lifecycle is related to production capacity and shortages in human capital (Hudáková et al., 2023).

When compared to mature firms, scale-ups differ in both priorities and challenges. Mature organisations generally focus on optimisation, efficiency and the protection of established market positions (Piaskowska et al., 2021). Their strategic emphasis often centres on incremental innovation and risk mitigation. Scale-ups, by contrast, continue to pursue high growth trajectories and face the complexities of rapidly expanding operations, including the development of internal infrastructure and human capital. Often, when a scale-up reaches a certain size and transitions into a more mature company, its growth rate tends to slow down significantly and in some cases, even becomes negative (Erhardt, 2018). This suggests that when a scale-up begins to experience degrowth, it may no longer qualify as a scale-up.

2.1.2 Conclusion and working definition

For this research the working definition of scale-ups adopted in this study aims to provide clarity. It is designed to be broadly acceptable and appropriate for the context of this research.

However, because data on economics of businesses are often confidential, the part of

Table 1: Definitions similar terminology scale-ups (own table)

	Definition	Source
High growth firm (HGF)	A firm has to have more than 10 employees and a yearly average growth rate of at least 20% over a three year period.	OECD (2010)
Gazelle	Gazelles form a subset of the group of high-growth enterprises. They are high-growth enterprises born five years or less before the end of the three-year observation period.	OECD (2012)
Start-up	An innovative small or medium-sized enterprise in the early stages of growth, aiming to develop and introduce new business models, products, or services to the market, with success still uncertain at the time of initial funding.	European Commission (2023)
Unicorns	A privately owned, tech or innovative company valued at over $1 billion.	Definition of Aileen Lee by European Commission (2022)
Small and Medium Entreprises (SME)	A company with a staff headcount between 10 and 249 and either an annual turnover between €2 million and €50 million or a balance sheet total between €2 million and €43 million.	European Commission (2003)

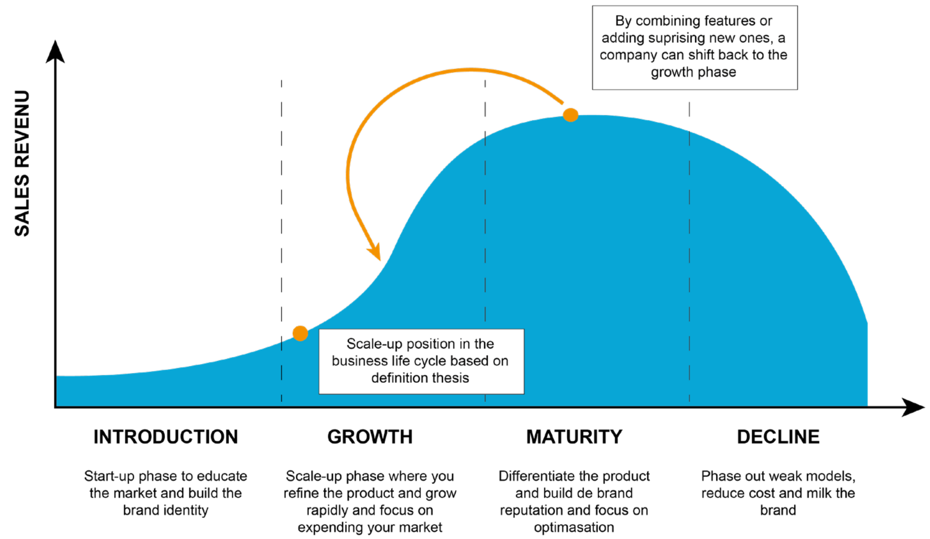


Figure 1: The business life cycle of a company and the position of a scale-up within the cycle, based on (Harvard Business Review, 2005; Rink & Swan, 1979)

reaching economies of scale are hard to prove. The working definition used in this thesis is:

> ***"Scale-ups are companies at a specific stage of organisational development, characterised by rapid growth after achieving a product-market fit. They have a validated business model and they are strongly focused on expansion, economies of scale and strategic scaling."***

Efforts have been made to keep it sufficiently general to ensure wide applicability. In the Table 2 below the different aspects are broken down in to their relative dimensions to make them applicable and transparent for the qualitative research.

2.2 Spatial distribution in current literature

In discussing the literature on the spatial distribution of scale-ups, it is first necessary to clarify what is meant by space and why it matters. Although scale-ups operate within the domain of the economy, economic activity does not take place in an abstract, placeless environment. It is increasingly recognised that economic growth is constrained by planetary boundaries and that spatial conditions fundamentally shape what economic activity is possible (Kitzmann et al., 2025). Recent policy documents show a similar shift, where the Dutch government acknowledges that space is an economic factor (Ministerie van Economische Zaken, 2025) and that the economy must continually adapt to new societal and environmental priorities. Even though spatial considerations are gaining attention, the integration of space and economic policy remains incomplete, as not all relevant spatial dimensions are fully taken into account (Rijksoverheid, 2025).

At the same time, economic policy is moving away from a narrow focus on GDP growth towards the broader concept of "Brede welvaart", which emphasises sustainable, social and long-term development within ecological limits (TNO Vector, 2024). Brede welvaart is closely linked to the idea of "verdienvermogen" (TNO, 2022), an alternative way of understanding economic growth. Rather than taking GDP as the starting point, verdienvermogen focuses on the balance and development of four forms of capital: social, human, natural and economic capital. It sets a forward-looking goal and emphasises the activities needed to achieve it, such as innovation through R&D investments, the ability to access new markets and respond to national trends, and ensuring adequate training and skills development. Together, these elements offer a perspective on sustainable economic growth, one in which scale-ups naturally fit due to their innovative and growth-oriented character. Recent (unpublished) TNO work adds that space is a precondition for strengthening verdienvermogen, because without sufficient and well-considered spatial capacity, these activities and forms of capital cannot develop effectively.

Space can therefore be understood as a productive factor, a strategic resource and a societal value (Schipper, 2025). Space is scarce in the Netherlands, which makes it necessary to make explicit choices about what is prioritised and what is not. From this perspective, space is not separate from the economy but embedded within it. Scale-ups, as economic actors, operate within this spatial reality, making their geographical distribution an essential part of understanding their behaviour and potential impact.

Table 2: Indicators for scale-ups based on literature (own table)

Dimension	Indicators	Sources
Quantitative	≥ 20% average annual growth in employment or turnover over a 3-year period ≥ 10 employees in third year Age > 3 years	Coad et al. (2024); Coviello et al. (2024); Jansen et al. (2023); OECD (2010)
One of the following qualitative indicators		
Financial	External funding received (Series A or B) Attraction of risk capital Have a valuation between $500 million and $10 billion	Coviello et al. (2024); European Investment Bank (2024); McKinsey & Company (2022); World Economic Forum (2024)
Innovation	High innovation, significant R&D expenditure	European Investment Bank (2024); OECD/Eurostat (2018)
Organisational	Governance maturity including of management and marketing & sales Being in a defined growth phase	Coad et al. (2024); Coviello et al. (2024); Hamilton and Ng (2025)
Efficiency	Achieve growth through economies of scale, meaning they increase revenue faster than costs by replicating processes efficiently. Therefor product or service is scalable.	Coad et al. (2024); Coviello et al. (2024); Monteiro (2019)
Internationalisation	Initiation of international transactions	Hamilton and Ng (2025); van Meeteren (2014)

2.2.1 Spatial requirements

In current literature on spatial requirements for scale ups the table of the following page summarises the key elements influencing these spatial requirements as identified in the literature and serves as the conceptual foundation for subsequent empirical analysis. An important key note here is that not everything is specific on scale-up literature because as said before often it is named in combination with other similar businesses.

Scale-ups depend on spatial conditions that enable rapid expansion, knowledge exchange, and access to talent. Their spatial needs evolve over time, yet certain fundamentals remain consistent: flexibility, high-quality infrastructure, and access to dynamic innovation ecosystems are essential (Florida et al., 2017; Stam & van de Ven, 2019).

Cities play a crucial role as containers for entrepreneurship and innovation, offering density, diversity and knowledge spillovers (Balland et al., 2020; Florida et al., 2017). Resulting in the benefits of matching, sharing and learning (Duranton & Puga, 2004). Clustering strengthens these effects by facilitating interaction and learning, while demographic characteristics shape both the feasibility and complexity of achieving such innovative environments (Pinheiro et al., 2022).

At the national scale, high-quality infrastructure is a key competitive advantage. Porter (1990) factor conditions indicate that although basic resources are globally available, regions with strong transport and digital infrastructure are better positioned to support scale-up growth.

The European scale-up landscape reflects three interlinked factors: city size, the firm's specific location, and access to knowledge institutions such as universities and research centres (Cséfalvay, 2024). These elements interact with broader ecosystem dynamics. Knowledge-driven ecosystems tend to cluster in metropolitan areas, whereas talent-driven ecosystems often emerge in peripheral regions, underscoring the interdependence of ecosystem components (Schrijvers et al., 2023).

Physical characteristics also influence scale-up location choices. Pluijmen and Verheul (2018) highlight the importance of public transport accessibility, walkability, event spaces, flexible workplaces, transparent ground-floor plinths, adaptable buildings, and recognisable district markers as features that strengthen innovation environments.

Table 3: Phyical elements of scale-ups based on literature (own table)

	Element	Description (measurable/observable)	Source(s)
Local level	**Digital infrastructure**	Access to ≥100 Mbps fibre internet or 5G connection; percentage of households with access to internet	Florida et al. (2017); Leendertse et al. (2022)
	Floor area	Total available indoor space in m²	Mazzarol and Choo (2003)
	Physical infrastructure	Distance in km to nearest highway exit, public transport hub or airport/seaport	Audretsch et al. (2014); Porter (1990)
	Price per m2	Cost per square meter in €/m2/year	Personal hypothesis
Regional level	**Access to capital**	Percentage of companies in financial sector within a certain km range	McKinsey & Company (2022); Stam and van de Ven (2019)
	Clustering	Number of scale-ups within a certain area or the presence of sectoral cluster or innovation hub	Brown and Mason (2017); Cséfalvay (2024)
	Founders' proximity	Distance between business location and founders' or founders place of residence	Leendertse et al. (2025); Mazzarol and Choo (2003)
	Intermediary services	The general availability of services such as legal, marketing, accountancy and consultancy services	Leendertse et al. (2022)
	Location hinder zones	Whether site lies in or near environmental zoning restrictions	Van den Berghe (2023)
	Proximity to university / research institutions	Presence of higher education, science parks or R&D;	Bergman and McMullen (2022); Boschma (2005); Cséfalvay (2024); Florida et al. (2017); Leendertse et al. (2022)
	Talent availability	Regional share of population aged 25–45 with tertiary education	Deloitte (2024); Leendertse et al. (2022); McKinsey & Company (2022); Pinheiro et al. (2022)
	Urban density	Urbanisation level or number of inhabitants per km²	Balland et al. (2020); Cséfalvay (2024)
	Workforce availability	Regional share of population with right education for the sector	Peirone et al. (2024)

However, spatial integration can be challenging for manufacturing-oriented scale-ups. Nuisance or hindrance zones limit where such firms can operate, particularly in mixed-use urban areas with residential functions (Van den Berghe, 2023).

2.2.2 Ecosystems, clustering and agglomeration effects on scale ups

Ecosystems, clusters and agglomeration advantages are frequently used in the same context, yet they refer to different spatial-economic structures. Distinguishing these concepts is important because each operates at a different scale and offers different explanatory mechanisms for the geographical distribution of firms, including scale-ups. This section defines the concepts, highlights their differences, and identifies which are relevant for this study.

Ecosystems represent broad networks of interdependent actors that collaborate and co-evolve, operating across various scales and structures. TNO (2023) distinguishes several types, including entrepreneurial ecosystems, innovation ecosystems, industrial ecosystems, and research & innovation ecosystems. These ecosystems differ in their main activities and whether they are geographically bounded or transboundary. They provide institutional, knowledge and organisational environments in which firms operate, and they often appear in

Table 4: Classification of ecosystems by main activity type and geographical boundaries based on TNO (2023)

		Geographical demarcation	
		Defined by geographic boundaries	**Transboundary**
Type of main activity	**Economic activities, strengthening value chains**	Entrepreneurial ecosystems	Industrial ecosystems
		Clusters	
	R&D, research and innovation	Innovation ecosystem	Research & innovation ecosystems

the literature as overarching explanations for regional economic performance.

For this research, however, only geographically bounded ecosystems are directly relevant, as they align with the municipal-level spatial analysis. Two types therefore receive particular attention. First, entrepreneurial ecosystems are defined as "a set of interdependent actors and factors that are governed so that they enable productive entrepreneurship within a particular territory" (Stam & Spigel, 2016, p. 1). Their focus is on economic dynamism within a defined boundary. Second, innovation ecosystems emphasise collective research, development and knowledge formation among actors within a geographic area (TNO, 2023). These two ecosystem types provide the institutional and knowledge context in which more localised clustering processes occur.

Clusters represent a narrower and more spatially concrete concept. They refer to the geographical concentration of firms and supporting actors within related or complementary sectors. Clusters benefit from proximity, which enables knowledge spillovers, specialised labour markets, shared suppliers and infrastructure. Social and structural embeddedness also play a role: structural embeddedness, in particular, captures how indirect network ties ("friends of friends") reduce uncertainty, enhance trust, and facilitate informal knowledge exchange between technicians or managers in neighbouring firms (Balland et al., 2015). Such mechanisms help explain why co-location can strengthen firm performance and innovation and there for are an explanation of the location choice of scale-ups.

The foundations of agglomeration advantages are typically grouped into three mechanisms: sharing, matching, and learning (Duranton & Puga, 2004). The sharing mechanism refers to the efficiency gains that arise when a larger urban scale enables firms and workers to share resources. Cities allow the joint use of indivisible facilities with high fixed costs, support a wider variety of differentiated intermediate inputs that raise sector-level productivity, enable deeper labour specialisation, and reduce individual risk through a pooled labour market (Duranton & Puga, 2004). The matching mechanism emphasises how agglomeration improves coordination between economic agents. In larger labour markets, the quality of matches improves as workers are more likely to find employers whose requirements align with their skills, while search frictions decrease, raising the probability of successful matches. Moreover, the abundance of potential partners in cities helps mitigate hold-up problems associated with incomplete contracts and relationship-specific investments. The concentration of firms and workers enhances the availability of both technically and commercially skilled labour (Peirone et al., 2024; Stam & Spigel, 2016). Agglomeration effects form the most immediate and spatially bounded mechanisms influencing firm behaviour. They arise from the geographic concentration of economic activity and include knowledge spillovers, improved access to skilled labour, dense financing networks, and shared services or suppliers (Harris & Menzel, 2023; Ooms et al., 2015). Knowledge spillovers are especially important for scale-ups, as unplanned interactions and dense professional networks facilitate the transfer of tacit knowledge. These effects are strongest at close range, as distance reduces interaction intensity (Boschma, 2005; Rosenthal & Strange, 2020). Access to venture capital, angel investors and other financial actors also improves in agglomerated areas (Stam & Spigel, 2016).

Taken together, ecosystems offer the broad institutional environment, clusters explain localised concentration of related actors, and agglomeration captures the functional externalities that scale-ups rely on during early and rapid growth phases.

2.2.3 Relatedness and unrelatedness

The concepts of relatedness and unrelatedness build directly on clustering and agglomeration theory by specifying which kinds of co-located industries contribute most to innovation and economic development. They offer a finer-grained explanation for why certain places become fertile environments for scale-ups.

Related variety (RV) assumes that knowledge spillovers occur most effectively between sectors that are technologically related but not identical (Boschma et al., 2010; Frenken et al., 2007). Cognitive proximity enables firms to absorb external knowledge, increasing innovation potential and firm performance. Frenken et al. (2014) further argue that firms do not necessarily benefit most from co-locating with actors in exactly the same industry, but rather from locating near firms in related industries, as such relatedness enhances performance through complementary knowledge bases. Scale-ups, which depend heavily on rapid access to relevant knowledge and networks, are therefore expected to thrive in regions with strong relatedness.

Unrelated variety (UV) offers a different but complementary advantage. Diversity across unrelated sectors enhances economic resilience by reducing vulnerability to sector-specific shocks (Frenken et al., 2007). While UV does not directly stimulate innovation in the same way as RV, it contributes to regional stability and long-term adaptability.

Recent work highlights the interplay between relatedness and unrelatedness. Boschma et al. (2022) show that breakthrough innovations emerge where related and unrelated technologies coexist. While relatedness drives innovation, unrelatedness provides the necessary distance for radical novelty to appear. The two forms of variety therefore complement rather than contradict each other.

The emergence of new economic activities follows historical patterns, a process known as regional branching (Boschma & Frenken, 2009). Regions tend to diversify into sectors that are technologically related to their existing specialisations. Path dependence thus shapes spatial development opportunities: regions expand along pre-existing trajectories, while unrelated diversification is less common and can increase the risk of industrial decline (Boschma et al., 2010). Mechanisms behind regional branching include firm diversification, spin-offs, labour mobility and social networks, all local processes that reinforce existing knowledge bases and help explain uneven spatial development.

Given this theoretical background, it is expected that municipalities with high relatedness will host more scale-ups, as related technologies provide the knowledge environment that supports rapid growth. Regions with high unrelatedness are more likely to emphasise economic stability rather than rapid expansion.

2.2.4 Relocation of firms

Firms relocate due to a combination of internal characteristics, location-specific factors and strategic considerations (Kronenberg, 2013).

Table 5: Explanation for relocation of firms (own table)

	Mechanism	Patterns and examples
Internal characteristics	How do internal dynamics create the need to move?	Expansion or downsizing changes spatial needs Start-ups relocate during rapid growth Need for cost reduction Mature firms move less due to local embeddedness and higher costs
Location-specific push and pull factors	What aspects of the current or alternative location influence relocation?	High land and labour costs, congestion or poor amenities push firms away Affordable land, specialised clusters and diverse economies pull them in
Strategic considerations	How far and where should the firm move to balance costs and opportunities?	Short-distance relocations reduce transaction costs and retain employees and social capital Relocate to find better funding opportunities and expand the market

These influences can be grouped into three categories, an overview is given in Table 5.

Firm-specific drivers relate to a firm's life cycle, operational changes, and financial capacity. Growing or downsizing firms often need premises that better match their spatial needs. Start-ups experiencing rapid sales growth frequently move to support further expansion (Lee, 2020). Low-technology firms may relocate to reduce labour costs, while innovative firms are typically more mobile, expanding towards metropolitan centres to access specialised services and markets (Frenken et al., 2007; Kronenberg, 2013). In contrast, older and larger firms tend to be less mobile due to higher relocation costs and local embeddedness (Kronenberg, 2013).

Location-specific push and pull factors stem from regional characteristics. High population density, land prices and sector-specific wages push firms, especially manufacturers, towards less dense, affordable areas. Conversely, urban regions with strong amenities, diversity and clustering effects pull knowledge-intensive firms through localisation and Jacobs externalities (Frenken et al., 2007; Kronenberg, 2013). Proximity often functions both as a push (costs) and pull (network retention) factor.

Strategic relocation choices concern the distance and context of the move. According to Transaction Cost Economics, firms prefer short-distance relocations to maintain local networks and minimise moving costs (Lee, 2020). Such proximity supports higher post-relocation performance, while long-distance moves rarely yield comparable benefits. For digital or Internet-based firms, physical proximity is less relevant, as online operations reduce transaction costs and place dependence.

Some scale-ups opt for international relocation, primarily to access growth capital. Dutch start-ups often find that foreign investors, particularly in the US or Germany, are more willing and better resourced, easing the path to scaling (Deloitte, 2024). Research shows that around 6% of Dutch start-ups relocate abroad, with 85% moving to the US and this small group generates 17% of all start-up value created (Weik et al., 2024). Internationalisation is not only driven by capital but also by sector-specific trends, global "buzz" and the perceived benefits of being part of international innovation circuits (van Meeteren, 2014).

2.2.5 Implementation for this report

Various elements from the literature on the spatial distribution of scale-ups are discussed. To provide a coherent overview, an adaptation of the framework developed by Katz and Wagner (2014) is employed. Their report presents a framework explaining how innovation districts emerge, based on three main components: economic, physical, and networking assets. Figure 2 illustrates their framework.

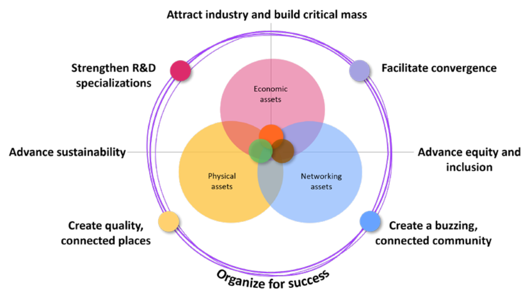


Figure 2: Framework for the three starting assets: economic, physical and networking assets of innovation districts (GIID, n.d.)

For the purpose of this study, specifically to gain a better understanding of how scale-ups spatially emergy and influence the spatial distribution of scale-ups, a modified version of their framework is developed. A slight adjustment is made to the networking assets

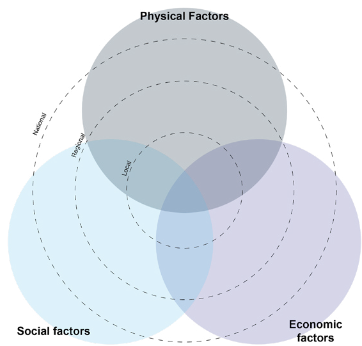


Figure 3: Framework to show the scale-up-specific location factors (own image)

dimension. While Katz and Wagner's model focuses primarily on innovation districts, the present study examines the broader geographical distribution of scale-ups across the Netherlands.

Therefore, the concept of networking assets is expanded to include social assets, acknowledging that much of the literature also highlights the importance of social and demographic conditions alongside networking factors. This adaptation results in the framework presented below, which will be further refined in the next section to form the final version used for the empirical analysis.

2.3 Scale ups in policy context

Recent policy literature emphasises the role of scale-ups and innovation in driving economic growth. Scale-up policies operate across multiple spatial levels, each with distinct governance dynamics. At the international level, initiatives such as European strategic autonomy influence national and regional agendas. National governments coordinate overarching frameworks, while provinces shape regional priorities. At the local level, municipalities have the greatest influence on spatial implementation. Across the different scales you also have the sectoral policies. Examining these scales separately clarifies how multi-level governance shapes the policy landscape for scale ups.

2.3.1 International policy

The Letta Report (2024) highlights that the European Union's future influence depends heavily on the performance and scalability of its companies. It emphasises the need to support innovation by focusing on scale-ups, stating that scaling EU companies within the Single Market is essential to maintaining and strengthening the EU's international position.

Similarly, the Draghi Report (2024) points out that although the EU produces a comparable number of start-ups to the United States, it falls behind in scaling them into large, competitive firms. To address this, the report recommends the creation of a new EU-wide legal framework to support scale-up growth and proposes expanding the budget of the European Investment Fund to provide more robust financial backing for scaling businesses.

The Competitiveness Compass takes these concerns in to account, noting that the Draghi Report underscores innovation as one of the points that is central to Europe's economic competitiveness (European Commission, 2025b). It also stresses the need to eliminate structural barriers that hinder growth. Mariotti (2024) describes this shift as a move towards becoming "as open as possible, as autonomous as necessary".

Very recently, the European Commission officially adopted Draghi's recommendations. On 28 May 2025, a new strategy was published (European Commission, 2025a), positioning Europe as a "powerhouse for start-ups and scale-ups." This strategy includes several key measures: fostering innovation-friendly environments, improving financing options through a new Scale-up Europe Fund, supporting market uptake and international expansion and attracting and retaining top talent. Spatial planning is briefly mentioned in the need for adequate housing for talent and access to infrastructure. One of the things the European Union is going to do is the Charter of Access for Industrial Users. This will help SMEs access state-of-the-art facilities, networks and services.

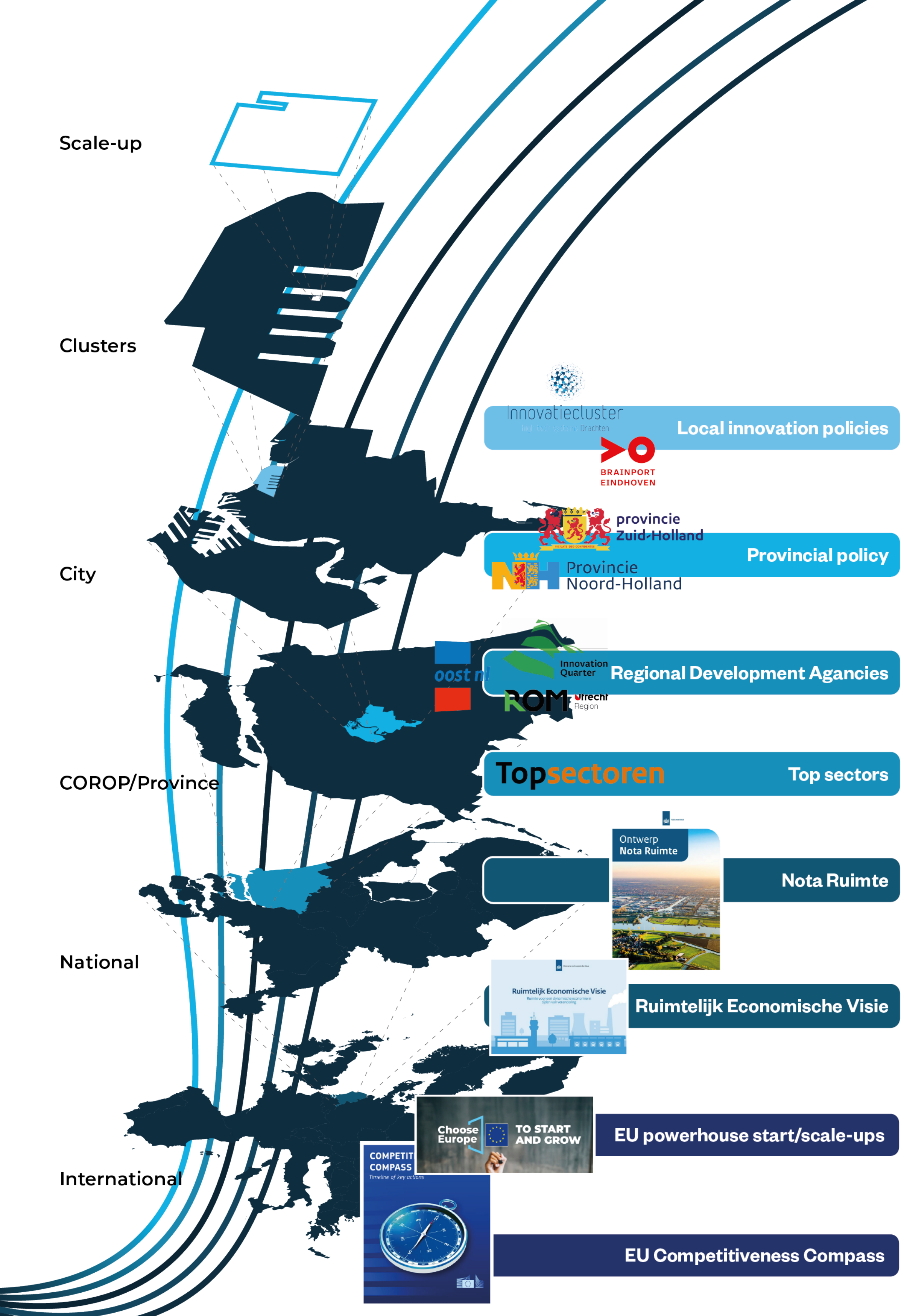
Interestingly, the action plan accompanying the communication outlines that by 2026, the EU will formally define what constitutes a start-up, a scale-up and an innovative company (European Commission, 2025c). This research is therefore ahead of ongoing policy developments and could provide valuable support in shaping future strategies.

2.3.2 National policy

At the national level, scale-ups have recently become a debate in the Netherlands. State Secretary Keijzer (2019) highlighted that while the country has a strong start-up base, the transition from start-up to scale-up remains difficult. This transition is vital, as scale-ups are key drivers of innovation, productivity, and employment. As Adriaansens (2023) emphasised in "Startups en scale-ups als motor voor transities en groei", successful scale-ups fuel economic growth and sustain a competitive economy. Yet, the Dutch ecosystem underperforms compared to neighbouring countries: Beljaarts (2025) found that only 21,5% of Dutch start-ups evolve into scale-ups, compared to 40,6% in Germany, signalling a significant growth gap.

For decades, Dutch spatial policy has been characterised by decentralisation, transferring decision-making to provinces and municipalities (van Straalen et al., 2015). Meanwhile, scale-up policy remains primarily the responsibility of the Ministry of Economic Affairs and Climate Policy (EZK) and the Netherlands Enterprise Agency (RVO). Current Dutch policy seeks to create a strong entrepreneurial climate by enhancing access to capital, talent, knowledge, networks and markets through measures such as residence permits for startups, financing schemes, valorisation strategies and branding campaigns (Adriaansens, 2023). Leaving the physical conditions for scaling firms largely unaddressed.

In the new Ontwerp Nota Ruimte (Rijksoverheid, 2025), space for start- and scale-ups is mentioned only once, in the context of innovation environments, stating merely that there should be "space for start- en scale-ups," without further elaboration. The Ruimtelijk Economische Visie goes somewhat further by dedicating a separate chapter to space for the economy. It introduces the notion of "ruimte voor een doorgroeiperspectief", which is a step forward, but it remains unclear what this entails in practice or where such space should



be located (Ministerie van Economische Zaken, 2025). As noted in Section 2.2, national policy is gradually beginning to acknowledge the spatial dimension of the economy, yet this is far from self-evident. In a personal discussion with the Ministry of Economic Affairs, it was even briefly noted that the department is internally siloed, those responsible for economic policy do not automatically consider the spatial implications of their decisions.

Although scale-ups are increasingly recognised as crucial for the Dutch economy, there is no clear understanding of the spatial conditions and local environments that enable firms to scale, and national policy offers no concrete guidance on where and how such space should be provided.

2.3.3 Regional and local policy

At the regional and local levels, a wide range of initiatives exists across the Netherlands to support scale-ups. What immediately stands out is that most attention focuses on investment instruments provided by various institutions. The Regional Development Agencies (ROMs) strengthen their regional ecosystems by sharing knowledge and connecting entrepreneurs, knowledge institutions and governments, thereby linking scale-ups to existing networks and support structures (Ministerie van Economische Zaken, 2024). They also provide capital to fast-growing firms, with a combined investment volume of €214,9 million in 2024. The Netherlands currently has nine ROMs, which work closely with provincial governments. In addition, the ROMs play an important role in attracting and retaining foreign firms within their regions (Ministerie van Economische Zaken, n.d.). Operating at a supra-regional scale, their mission encompasses innovation, internationalisation and investment. Regional policy can therefore address aspects of economic development that would not emerge naturally through market forces or be taken up by other actors (Bours et al., 2021).

Local governments, in turn, are responsible for translating national and regional ambitions into spatial implications, such as zoning, land-use allocation and planning frameworks. This division of responsibilities, national and regional institutions focusing primarily on economic instruments and municipalities on spatial implementation, helps to explain why little explicit attention is paid at the national and regional level to the spatial requirements of scale-ups. In addition, several cities have developed city-specific policies to strengthen particular innovation ecosystems. The most prominent example is Brainport Eindhoven, where the municipality actively collaborates with industry and knowledge institutions to support high-tech and advanced manufacturing clusters (Brainport Development, 2025). Other cities also pursue targeted ecosystem strategies, such as Amsterdam with its focus on fintech, creative industries and digital platforms, Delft with its deep-tech and university-driven innovation environment, and Rotterdam with its emphasis on maritime, energy transition and port-related technologies (InnovationQuater, 2025). These local strategies demonstrate that some municipalities explicitly recognise the spatial and infrastructural conditions required for innovation-driven firms

2.3.4 Sectoral policy

One of the former national policy instruments aimed at stimulating innovation in Dutch SMEs was the Mkb-innovatiestimulering Regio en Topsectoren (MIT). Although not developed specifically for scale-ups, the MIT programme sought to encourage innovation by create collaboration between firms, knowledge institutions and governments, aligning regional and national innovation agendas, and strengthening the country's technological and sustainable competitiveness. The scheme offered several funding instruments tailored to different stages of the innovation process, including feasibility projects (up to 40% subsidy, max. €20,000), R&D collaboration projects

(€50,000–€350,000), and knowledge vouchers or networking activities to support knowledge exchange within innovation clusters (Rijksdienst voor Ondernemend Nederland, 2025).

As part of the MIT, the Ministry of Economic Affairs had the top sector policy in 2018 (CBS, 2018). The ten designated top sectors aim to reinforce areas in which Dutch businesses and research institutions possess strong international positions. Through partnerships between government, industry, researchers and societal organisations, the top sectors pursue innovation, human capital development, scientific progress and the capacity to address societal challenges (Rijksdienst voor Ondernemend Nederland, 2025). The sectors include Agri & Food, Chemistry (ChemistryNL), Creative Industries, Energy, High Tech Systems & Materials (Holland High Tech), Life Sciences & Health (Health Holland), Logistics, Horticulture and Starting Materials, Water & Maritime, and ICT. An overview of their classification based on SBI 2008 codes is provided in Appendix A. The original top sector framework and MIT scheme have since been replaced by new policy instruments, like key technologies, but their underlying logic of strengthening sectors and value chains remains influential in the Dutch policy landscape.

9
Regional Development Agencies

10
Top sectors

€214,9 m.
Investment volume of the nine ROM's

Recent analyses stress that, in order to strengthen the Netherlands' competitive position globally, it is increasingly important to develop clear sectoral specialisations. Sectors such as energy and food hold particular promise, given the country's strong expertise and established knowledge base (McKinsey & Company, 2022). However, each sector requires a distinct type of workforce, infrastructure and innovation environment and, critically, specific spatial and locational conditions. These spatial requirements vary considerably across sectors, implying that the development of scale-ups cannot be understood solely through economic or innovation policy: it also depends on the availability of physical environments.

2.4 Research gaps and relevance

Although scale-ups are increasingly recognised as critical drivers of innovation, employment and economic dynamism, academic research has largely overlooked them as spatial actors. Existing studies tend to group scale-ups together with start-ups, SMEs or high-growth firms, resulting in limited conceptual clarity regarding how scale-ups behave in space and which spatial mechanisms support their growth. This creates a conceptual gap: the literature provides partial insights into individual factors such as clustering, relatedness, innovation ecosystems and locational dynamics, but no integrated framework exists that explains how these elements interact specifically for scale-ups.

> ***"no integrated framework exists that explains how these physical elements interact specifically for scale-ups"***

In other words, the underlying mechanisms that connect scale-up growth to spatial environments have not yet been systematically conceptualised.

A second gap concerns the empirical evidence base. While much is known about spatial patterns of entrepreneurship in general, no longitudinal, nation-wide analysis has been conducted for location distribution of scale-ups in the Netherlands. The absence of such analyses means that policy debates about space for the economy and scale-ups specifically lack empirical grounding. Despite recent shifts in Dutch policy acknowledging space as an economic factor, no data-driven research currently demonstrates where scale-ups actually grow, how their distribution changes over time and which spatial conditions appear to matter most. As a result, spatial planning and innovation policy remain disconnected, even though both domains increasingly rely on the same kinds of firms to achieve future competitiveness.

A third gap concerns the methodological approach used in existing research. There is currently no research that combines firm-level longitudinal data with spatial statistical techniques and geospatial visualisation to uncover national-level patterns in scale-up behaviour. The lack of such a methodological basis also prevents the development of a quantitative understanding of how different spatial elements relate to each other.

This thesis therefore addresses these gaps by conducting one of the first exploratory, data-driven examination of the spatial distribution of scale-ups in the Netherlands. The study develops an initial conceptualisation of scale-ups as spatial actors and uses a mixed-method approach, combining longitudinal LISA data, GIS-based spatial analysis and theoretical interpretation, to identify the spatial mechanisms that may shape scale-up development. Although the aim is modest and exploratory, the results provide the first structured evidence on how spatial factors, sectoral characteristics and regional conditions interact. This forms a foundation upon which more refined theoretical and empirical work can build.

The societal relevance of this study lies in demonstrating that economic development and spatial choices are inseparable. By clarifying where scale-ups emerge, which environments they rely on and how these patterns evolve over time, this thesis contributes to the development of planning approaches that enable economic activity to grow within spatial limits. It also provides initial building blocks for designing a conceptual framework that links spatial conditions to scale-up growth, thereby supporting policy efforts at municipal, regional, national and European levels to strengthen innovation capacity and contribute the Dutch "verdienvermogen".

2.5 Conceptual framework

Based on the existing literature, a conceptual framework has been developed that is tested and elaborated in this study. The framework synthesises the key concepts and mechanisms identified in prior research and provides the analytical foundation for addressing the identified research gap. It also informs the methodological design of the study.

The conceptual framework starts with the intention to relocate, which initiates a mechanism ultimately resulting in a location choice. This mechanism is characterised by both centrifugal and centripetal forces influencing location decisions, drawing on the framework proposed by Despotovic and Cvetanovic (2017). Within this mechanism, several interrelated elements play a role.

First, the framework includes generic drivers of relocation, derived from the spatial economic literature, which can be applied broadly to firms in general. In this study, however, these drivers are examined specifically in relation to scale-ups. Second, scale-ups are conceptualised as distinct spatial actors that operate under particular conditions and constraints. These are captured as scale-up-specific factors within the framework. Third, the model accounts for sectoral differences among scale-ups, recognising that location preferences may vary across industries. Finally, the literature identifies networks as an additional force shaping location choice, influencing both access to resources and spatial embeddedness.

The relative importance of these factors is expected to vary across individual scale-ups. While some scale-ups may be more strongly influenced by sectoral characteristics, others may place greater emphasis on scale-up-specific conditions. Accordingly, the conceptual framework functions as a hypothesis-driven model grounded in the reviewed literature. It serves as the analytical basis for the empirical investigation, with the results indicating how these factors interact in practice. In the figure below the conceptual model is shown. The synthesis chapter subsequently examines how this mechanism manifests for scale-ups and how it contributes to explaining their location choices.

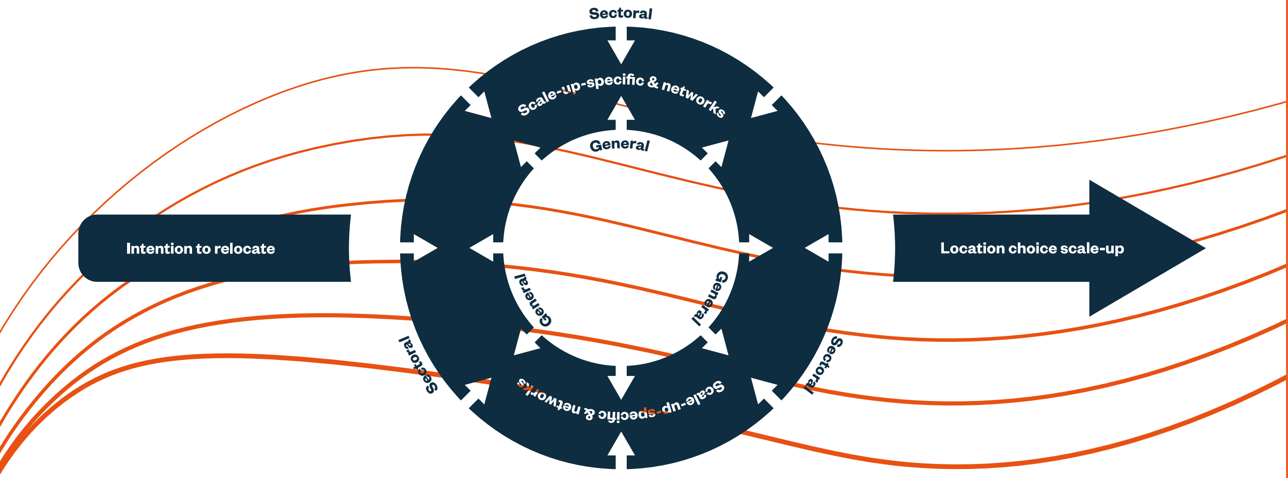


Figure 4: Conceptual framework spatial dynamics scale-ups (own image)

"When it comes to the growth of start-ups into scale-ups, we are not doing well. Only 21% of Dutch start-ups grow into the scale-up phase, compared to 60% in the US and 37% in Germany"

M.A.M. Adriaansens, 2023
Former Minister of Economic Affairs and Climate Policy

3 Methodology

This research investigates the spatial dynamics that explain the geographical distribution of scale-ups and their sectoral variation in the Netherlands over time. The central research question is:

> “What spatial dynamics explain the geographical distribution of scale-ups in the Netherlands over time?”

To address this question, four sub-questions guide the analysis:

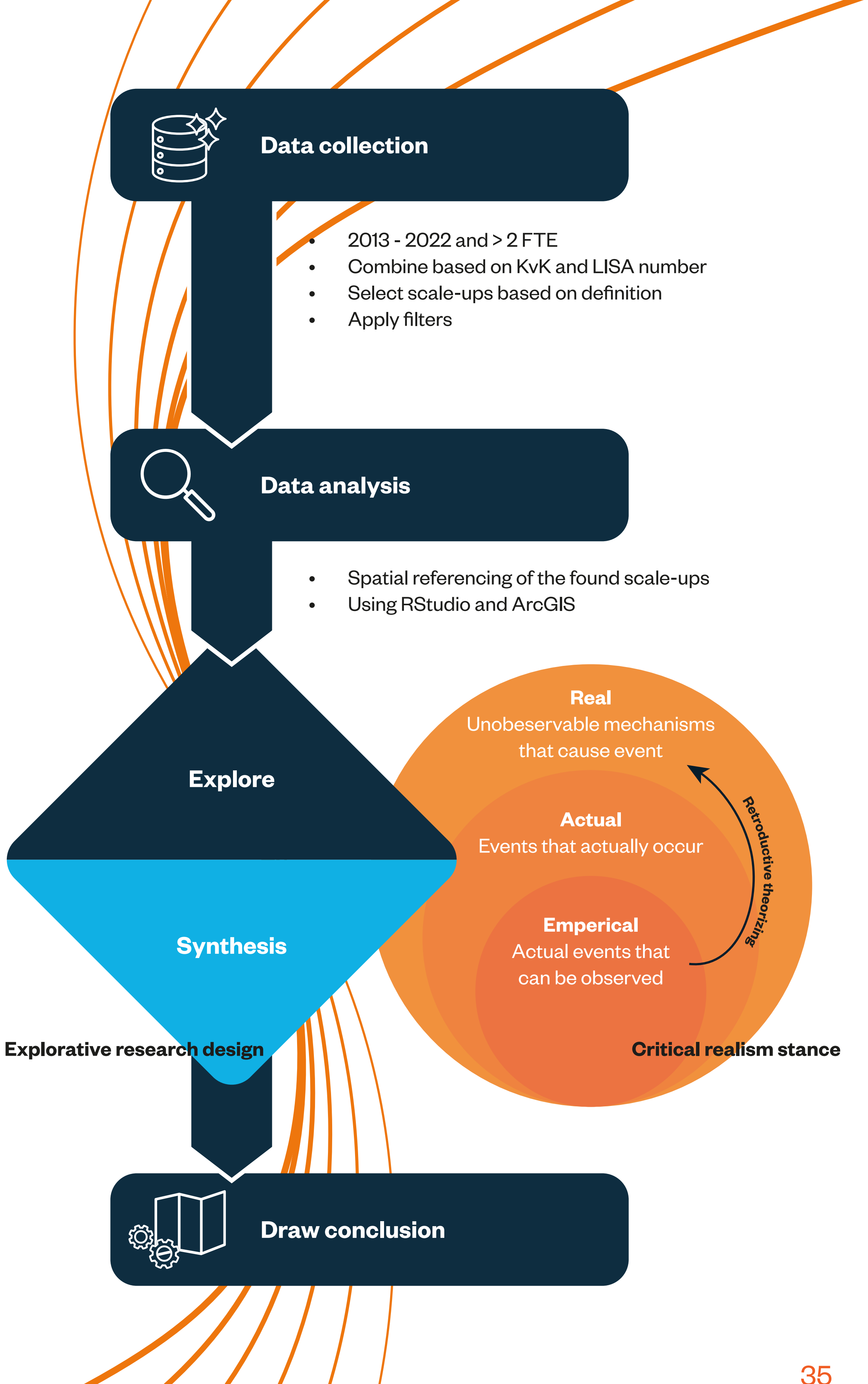
SQ1. How are scale-ups and their spatial characteristics defined in academic and policy literature?
SQ2. How has the geographical distribution of scale-ups in the Netherlands evolved over time?
SQ3. What scale-up-specific factors influence the locational choices of scale-ups in the Netherlands?
SQ4. How does sectoral specialisation influence the distribution of Dutch scale-ups?

The research design is primarily quantitative and builds on a longitudinal firm-level dataset covering a ten-year period from 2013 to 2022. The data is derived from the LISA register and provide annual observations for all Dutch firms, enabling the identification of scale-ups and the analysis of their spatial patterns over time. This quantitative analysis is complemented by a small number of exploratory interviews with practitioners, which serve to provide contextual understanding but are not treated as formal data within the analysis.

The study uses a broad, data-driven approach aimed at identifying national-level spatial patterns while also allowing for insights at the municipal level. Although the primary lens is national, the data enable statements at a more local scale, contributing to a finer-grained understanding of spatial dynamics. This approach makes it possible to identify spatial dynamics by examining patterns that appear in the data across the country. This design is suitable because existing literature often relies on insights from studies of start-ups or mature firms, rather than scale-ups specifically (Florida et al., 2017; Leendertse et al., 2022; Pinheiro et al., 2022). There is currently no comprehensive, data-driven overview dedicated to the spatial behaviour of scale-ups specifically, making this study the first to provide such a systematic examination. By constructing a longitudinal dataset that identifies scale-ups and their trends and characteristics, the study aims to generate an evidence base that can support future research and provide a foundation for more targeted theoretical development. The research design is built on three core components: a GIS-based spatial analysis of firm-level LISA data, existing literature on scale-ups and spatial economic processes and relevant national and regional policy documents. An overview of the research design is given on the right side.

3.1 Research approach and rationale

This research adopts an explorative approach. Because academic knowledge on the spatial behaviour of scale-ups is still limited, the aim is not to test established theories but to map



patterns and identify elements that may help explain their geographical distribution. The study is intended as an empirical starting point from which more refined theoretical work can develop.

The methodological approach is retroductive.

> "Retroduction or retroductive theorizing is the process of devising a theory, which requires moving from an observation of concrete phenomena to reconstruct the basic conditions for these phenomena."
>
> *(Mukumbang et al., 2021, p. 4)*

Rather than deriving generalisations purely inductively or testing predefined hypotheses deductively, the analysis iteratively connects insights from the longitudinal dataset with concepts from clustering, agglomeration, firm relocation, relatedness and entrepreneurial ecosystem literature. These concepts help interpret the patterns in the data and support the development of initial explanations.

This retroductive logic aligns with the study's critical realist stance, which is adopted precisely because the distribution of scale-ups is both complex and theoretically underdeveloped. Critical realism assumes that an objective reality exists but is layered and often only partly observable and combines this with a relativistic epistemology (Stutchbury, 2021). Structures and actors have generative powers, yet these powers are not always activated. When they are, they operate as dynamics that produce observable events. Even though these dynamics are invisible, they can be deduced by examining recurrent patterns and the circumstances that enable them. Therefore, a key component of critical realism methodology is recognising and conceptualising these dynamics (Mukumbang, 2021). This perspective distinguishes between the empirical level (observable data), the actual level (events and processes that occur), and the real level (underlying structures and dynamics), see Figure 6. Given the absence of established patterns and that relevant dynamics have not yet been formulated in the literature, critical realism provides an appropriate framework. It acknowledges that observed patterns may be shaped by deeper structures that cannot be directly measured, and that any explanation at this stage must remain provisional. In line with its relativistic epistemology, critical realism explicitly recognises that the identification of dynamics is shaped by the researcher's theoretical lens and methodological choices. This requires reflexivity regarding how these choices influence interpretation, while also maintaining openness to alternative explanations. Such an approach is especially appropriate in exploratory contexts, where existing theory is limited and explanation must remain both tentative and revisable.

Within this paradigm, retroductive reasoning enables the research to identify plausible underlying dynamics from empirical patterns, without claiming completeness or causal certainty. The longitudinal structure of the dataset further supports this process by revealing how patterns evolve over time, allowing the study to identify structural conditions that might help explain these developments.

3.2 Data collection

The study area of this research covers the whole of the Netherlands in the period from 2013 to 2022. During this period, the Netherlands had between 443 and 345 municipalities. For this research only companies with two or more employees were taken into account to eliminate all the freelancers or self-employed professional. The number of companies in these years is between 520.000 and 550.000 Of these, between 2.089 and 3.546 companies fall under the category of scale-ups or fast-growing companies for each year.

The LISA dataset forms the core of the quantitative analysis. It provides annual observations of all firm establishments in the Netherlands and is therefore suitable for identifying fast-growing firms over time. From LISA, the variables extracted for analysis include the SBI sector code, the number of jobs, spatial coordinates and the BAG surface area of buildings. Additional variables such as the LISA number (LISANR), municipality, province and COROP region are used for data processing and spatial referencing, but not as primary analytical variables, a complete overview is given in Appendix B.

Scale-ups are identified according to the definition applied in Section 2.1.2. To operationalise this definition, the dataset for each year is first reduced to the unique LISA number, Chamber of Commerce dossier number, number of jobs, and company name. The LISA number acts as a stable identifier, while the Chamber of Commerce dossier number is used to track firms whose identifier may have changed.

The processing of the data is carried out in RStudio and ArcGIS. A base year is created for each firm, after which three consecutive years are linked to it. This ensures that firms included in the analysis have existed for at least three years. Firms with fewer than ten jobs in any of the three years are removed. Growth is then calculated using the compound annual growth rate (CAGR):

$$\text{CAGR} = \left(\frac{\text{FTE's end}}{\text{FTE's begin}}\right)^{1/3} - 1$$

Firms with a CAGR above 0,20 are retained as potential scale-ups. For each potential scale-up, the final year of the growth period is used as the reference point. The addresses of firms are cross-checked to determine whether they have relocated, and relocations are recorded in a separate column. Finally, a sectoral filter is applied to exclude industries not relevant for this research, see Table 6.

Operationalisation of scale-up definition

≥ 10 FTE
Minimum numer of FTE for a scale-up

> 20% CAGR
Annual growth over three consecutive years for scale ups

> 3 years
Minimum age of a scale up

Table 6: SBI 2008 filters for which sectors have been excluded for scale-ups (own table)

SBI 2008 code	Sector description
O	Public administration and defence; compulsory social security
P	Education
U	Activities of extraterritorial organisations and bodies
92	Gambling and betting activities
94	Activities of membership organisations
87	Residential care activities
88	Social work activities without accommodation
471 and 473	Retail sale in non-specialised stores (supermarkets) and retail sale of automotive fuel in specialised stores (tank station)
561 and 563	Restaurants and mobile food service activities and beverage serving activities
641 and 643	Monetary intermediation (banking) and trusts, funds and similar financial entities

3.2.1 Spatial referencing

To analyse geographical patterns, all firms are geographically anchored by linking them to administrative boundaries within the Netherlands. Coordinates are converted into spatial objects and connected to municipalities and COROP regions. This allows the analysis to operate at both the national level and more fine-grained local scales.

3.2.2 Additional public datasets

Two types of public datasets are used to enrich the analysis. First, socio-economic indicators from CBS Kerncijfers Wijken en Buurten (CBS, 2022) provide contextual information on the environments in which scale-ups operate. Second, financial data on commercial real estate from NVM (2023) offer additional insight into the cost and availability of business space.

The data in LISA is considered suitable for the rest of this research because it records establishments and job counts at the firm location, providing a consistent basis for identifying fast-growing companies. The dataset is collected using standardised procedures and is representative for the whole of the Netherlands. Although some inconsistencies may occur, manual checks are performed to verify whether firms flagged as potential scale-ups meet the criteria.

3.2.3 Illustrative interviews

The quantitative dataset is complemented by four exploratory interviews. Two interviews were conducted with CEOs of scale-ups in the high-tech sector, as these individuals are responsible for strategic decisions regarding location and expansion. Two additional interviews were held with policy officers from the Ministry of Economic Affairs to reflect on preliminary findings and compare them with policy experience. The interviews were semi-structured for the scale-up CEOs and open-ended for the policy officers. They were conducted either online (approximately 30 minutes) or in person (approximately one hour). The purpose of these interviews is purely illustrative: they provide contextual understanding and help interpret certain findings, but they are not used as empirical data in the formal analysis.

3.2.4 Composing variables

For this study, various variables are collected from existing data sets and some are constructed. The most are collected through datasets but there are a view variables composed. A complete overview of all the variables is given in Appendix B.

GIS related variables

Several variables were also generated by analysing the data in GIS. These include distance to public transport, distance to education, distance to business parks, and distance to motorways. Using Near calculations, the distance between the identified scale-ups and the locations in the databases was determined. In addition, the type of educational facility was linked to the dataset.

Relatedness and unrelatedness

To calculate the related variety (RV) and unrelated variety (UV) of municipalities the formulas from Frenken et al. (2007) are being used. The UV and RV are calculated using the following three formulas in R.

$$\mathrm{UV} = \sum_{\mathrm{g}=1}^{\mathrm{G}} \mathrm{P_g} \log_2 \left(\frac{1}{\mathrm{P_g}} \right)$$

$$\mathrm{RV} = \sum_{\mathrm{g}=1}^{\mathrm{G}} \mathrm{P_g} \mathrm{H_g}$$

$$\mathrm{H_g} = \sum_{\mathrm{i} \in \mathrm{g}} \frac{\mathrm{p_i}}{\mathrm{P_g}} \log_2 \left(\frac{1}{\mathrm{p_i}/\mathrm{P_g}} \right)$$

The following values are used for this purpose. The municipality numbers from Statistics Netherlands (CBS) for aggregation and the department, which is the 2-digit code, are used for the calculation. And the section (A-U) fall. Based on municipality, these points are aggregated into two lists with, on the one hand, numbers per 2-digit code and, on the other hand, aggregated into numbers per section. The variation is calculated based on the number of companies and not employment, as is often the case. This is because this study looks at how companies are geographically spread across sectors.

The total entropy (Hg) represents the overall level of sectoral diversity within a municipality, capturing both related and unrelated sectors. A higher Hg indicates a more diversified local economy, while a lower value suggests sectoral specialisation. The decomposition into unrelated (UV) and related (RV) variety distinguishes between diversity across and within main sector groups.

Location Quotient

For the clustering the Location Quotient (LQ) is used:

$$\mathrm{LQ_{k,r}} = \left(\frac{x_k / x_r}{x_{kNL} / x_{NL}} \right)$$

x_k = number of companies in sector k in region r

x_r = total number of companies in region r

x_{kNL} = number of companies in sector k across all regions

x_{NL} = total number of companies across all regions

The LQ indicates whether sector k is over- or underrepresented in region r. This calculation can be performed for all geographical levels (e.g., COROP, municipality, or province) and for each of the past ten years, allowing for comparisons over time, as the LQ is not static. An LQ ≥ 1 means that the sector's presence in the region r is above the national average. For each geographical level, the LQs are ranked, and the two highest-scoring sectors with LQ > 1 are marked as specialised. Thus, for each year and each region, these represent the two sectors in which the region is most specialised (based on LQ). This selection forms the basis for identifying specialised sectors.

Enrichment ratio

The enrichment ratio in a region is based on the LQ and is calculated as:

$$\text{Enrichment ratio} = \frac{\mathrm{LQ_{scaleups\ in\ k,r}}}{\mathrm{LQ_{companies\ in\ k,r}}}$$

An enrichment ratio greater than 1 indicates that scale-ups are overrepresented in the regional specialisations, meaning they tend to reinforce and align with existing clusters. When the ratio is approximately equal to 1, scale-ups are evenly distributed across sectors in a way that mirrors the general business population. Conversely, an enrichment ratio below 1 suggests that scale-ups are underrepresented in the regional specialisations; they are more likely to emerge outside established clusters or in alternative niches. This approach makes it possible to examine whether the specialisations identified through the LQ correspond with an increasing concentration of scale-ups in those specialised sectors, or whether scale-ups tend to develop independently of established regional specialisations.

Relocation of scale ups

The relocation movements of scale-ups will be analysed in two ways. The first method involves examining the graph that shows at which value of t relative to a reference point most relocations occur. The formula used is:

$$\mathrm{M_{t,n}} = \mathrm{A_{t+n}} - \mathrm{A_{t+(n-1)}}$$

$M_{t,n}$ represents the number of relocations within the interval ending in year $t + n$.

$n > 0$ indicates a forward-looking interval (future relocations).

$n < 0$ indicates a backward-looking interval (past relocations).

For a base year $t = 0$, specifically: $n = A_n - A_{n-1}$

This method also allows the identification of firms that have relocated once, twice, three times, or more. Relocations are counted per year based on the arrival year. With the relocation of the data the relocation distance can also be calculated.

3.3 Data analysis

The data analysis followed an explorative and iterative structure. The analysis began with a broad visual and statistical exploration of the dataset, after which more advanced spatial and sectoral techniques were gradually introduced as specific patterns emerged.

The first step consisted of a descriptive exploration of the dataset in both R and GIS. In R, boxplots, summary statistics and basic categorisations were used to gain an initial understanding of sectoral distributions, building surface areas and geographical dispersion. In parallel, the full dataset was projected onto maps in ArcGIS to visually identify spatial patterns. GIS played a central role in both analysis and interpretation. The spatial dataset was enriched with CBS socio-economic indicators, education-related data, IBIS business park information and administrative boundaries. Through symbolisation, layering and structured map comparisons in ArcGIS, intermediate insights emerged that guided further steps in the analysis. The GIS visualisations also proved essential for communicating spatial dynamics in a clear and accessible way. The combination of statistical and cartographic exploration revealed early signals of clustering, regional variation and sectoral differences, which guided the selection of subsequent analytical methods.

3.3.1 Spatial statistical methods

To assess clustering while accounting for uneven economic density, an inhomogeneous Ripley's K-function was applied. This method distinguishes genuine point interaction from clustering that merely results from variations in background economic activity (Baddeley et al., 2001). Before conducting the hotspot analysis, a Global Moran's I was calculated to determine the overall degree of spatial autocorrelation and to assess the scale at which clustering occurs. Complementing this, a Getis-Ord Gi* hotspot analysis locations where scale-ups occur significantly more (or less) frequently than expected based on neighbouring areas (Getis, 2010). A Pearson correlation matrix was produced in SPSS to examine linear relationships between selected socio-economic variables, mainly derived from CBS Kerncijfers Wijken en Buurten. Although limited in scope, these correlations provided supporting insight into the socio-economic environments in which scale-ups emerge.

Longitudinal development was examined through an emerging trend analysis, which assessed whether particular regions exhibited significant temporal increases or decreases in scale-up activity. Finally, relatedness and unrelatedness were calculated using entropy-based measures to determine whether scale-ups tend to emerge in environments with strong sectoral relatedness or in more diverse settings.

3.3.2 Sectoral patterns

Sectoral patterns were analysed using heat maps and Location Quotients (LQ) to detect regional specialisation and entropy-based measures to capture related and unrelated variety at the municipal level. By plotting these indicators over ten years and comparing them across regions, the analysis revealed how sectoral diversity and specialisation relate to the presence of scale-ups. The enrichment ratio was used as an interpretative tool to explore whether scale-ups are over- or underrepresented in regional specialisations, acknowledging that this measure is conceptually derived from the LQ and serves primarily as an exploratory indicator.

3.3.3 Scope of the analysis

The analysis was highly iterative due to the exploratory nature of the research. New insights from GIS maps, descriptive statistics, policy documents and literature continually informed the next analytical steps. Throughout this process, causal interpretations were avoided. The findings are presented as correlational patterns and potential dynamics rather than definitive causal explanations. Interpretations were triangulated where possible using policy documents and illustrative interviews.

Certain analyses were excluded due to data limitations, particularly financial firm-level data, which prevented quantification of economic performance beyond employment growth. Local cluster analysis was also omitted, as the research focuses on national and regional spatial distribution rather than fine-grained, hyperlocal clustering. The analyses included were deemed sufficient once additional methods no longer yielded new or meaningful insights for answering the central research question.

3.4 Data plan

This research followed a structured Data Management Plan to ensure the secure, ethical and transparent handling of all data throughout the project. The study made use of both quantitative and qualitative data sources. The quantitative component relied on firm-level employment data from the LISA database (2013–2022). Additional spatial datasets, were collected from public open data portals including CBS and IBIS. These datasets were processed using R (RStudio) for cleaning, filtering and statistical analysis and ArcGIS for spatial analysis and the generation of visualisations.

The qualitative illustrative component consisted of semi-structured interviews with Dutch stakeholders, including professionals in economic policy and scale-up CEO's. The interviews were recorded (via Microsoft Teams or an external recorder) and transcribed by the researcher. Participants received an information sheet and digitally signed an informed consent form prior to participation. All interview transcripts were pseudonymised and participants were given the opportunity to review their transcript before finalisation.

All data and code were stored on TU Delft OneDrive, with access strictly limited to the researcher and supervisors. Copies of the documents were additionally backed up on an encrypted external hard drive, allowing personal data (names, contact details, consent forms) to be stored separately from the research dataset. Audio recordings were deleted immediately after transcription. Personal data was retained only for the duration of the project and erased at project completion unless academic publications arise, in which case pseudonymised data could be stored under supervisor responsibility for up to two years.

No research datasets was be deposited in a public repository due to licensing restrictions and the presence of human participant data. However, all methodological descriptions, analytical scripts and visual outputs relevant to reproducibility will be included in the published MSc thesis via the TU Delft Repository. The project follows the TU Delft Human Research Ethics Committee (HREC) procedures, with data processing grounded in informed consent and aligned with GDPR requirements. In Appendix C is the full Data Management Plan included.

3.5 Ethics

This study complies with the ethical standards of Delft University of Technology and the General Data Protection Regulation (GDPR). Ethical considerations primarily relate to the qualitative component involving semi-structured interviews with scale-up founders and spatial planning professionals.

Prior to data collection, the research was submitted for approval to the TU Delft Human Research Ethics Committee (HREC). All participants received an information sheet and provided informed consent, outlining the voluntary nature of participation, the right to withdraw, and data handling procedures. Only minimal personal data were collected and subsequently pseudonymised during transcription. Audio recordings were stored securely and deleted shortly after transcription.

The study does not involve vulnerable groups, sensitive topics, or commercial or political interests and is therefore considered low risk. Through informed consent, pseudonymisation and secure data storage, participant privacy and research integrity were safeguarded throughout the project.

3.6 Variables and context

To provide contextual background for the analysis, the right side of the page presents an overview of key variables used in the research alongside a spatial visualisation of Dutch scale-up locations over the past ten years. The map displays aggregated scale-up activity at the regional level, ensuring that individual firms cannot be identified. This visual context supports the results through giving context by illustrating long-term spatial patterns in scale-up development across the Netherlands.

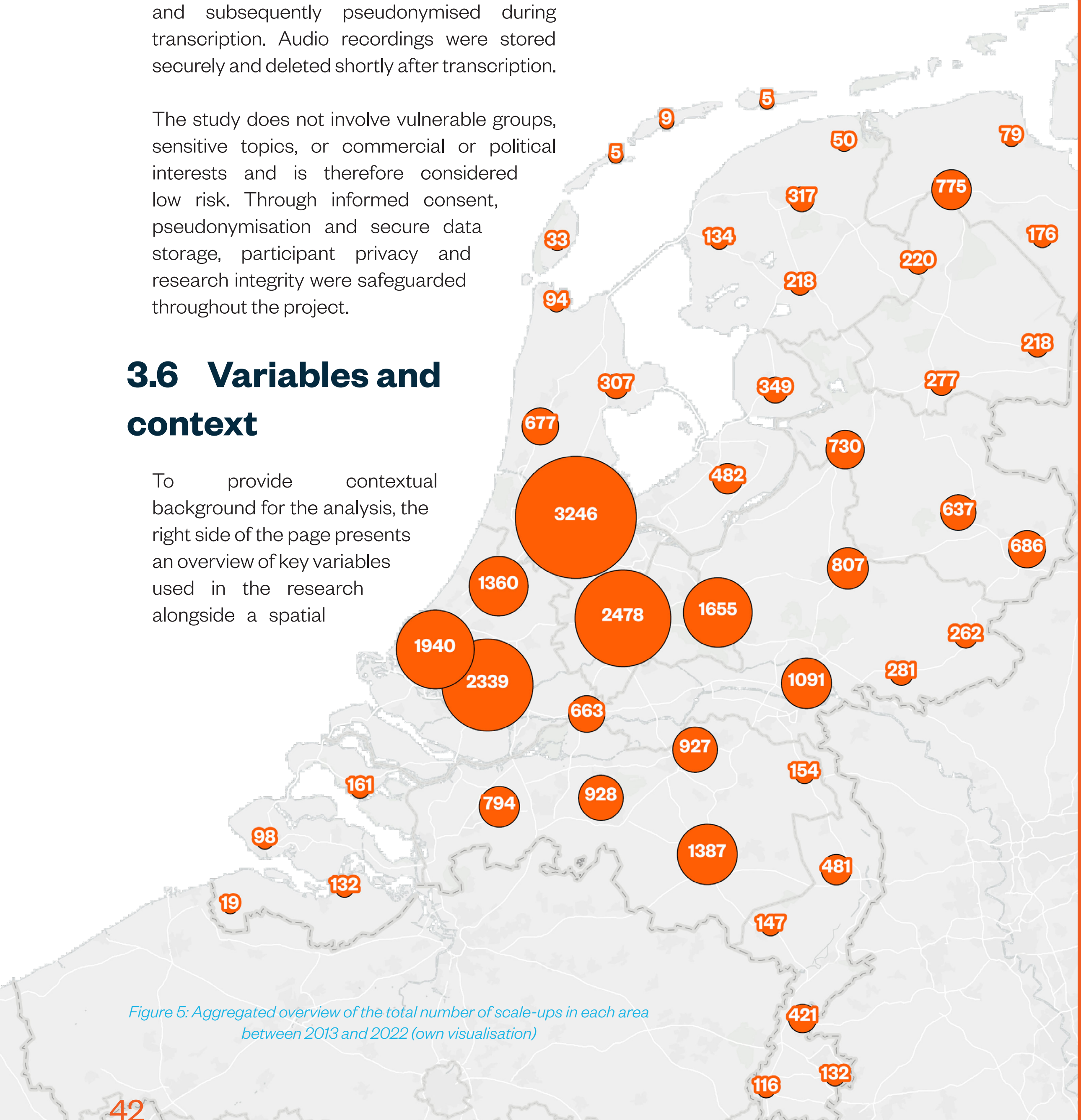


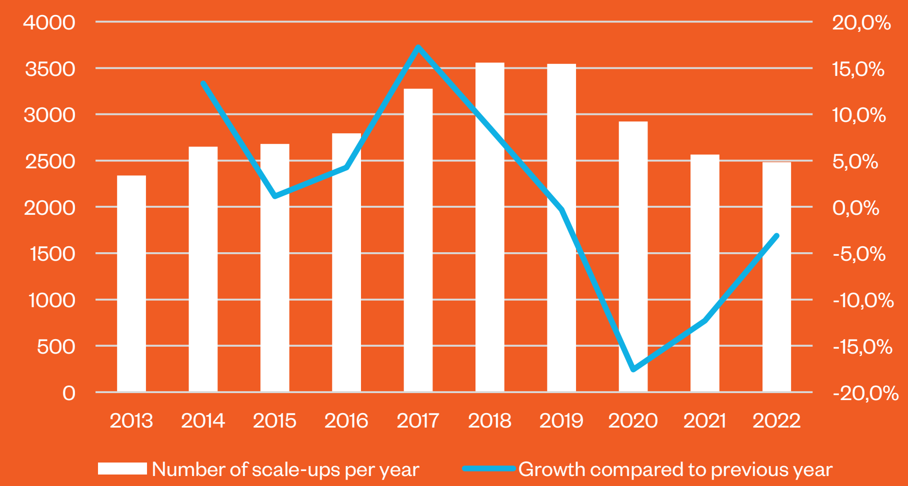
Figure 5: Aggregated overview of the total number of scale-ups in each area between 2013 and 2022 (own visualisation)

Variables and context

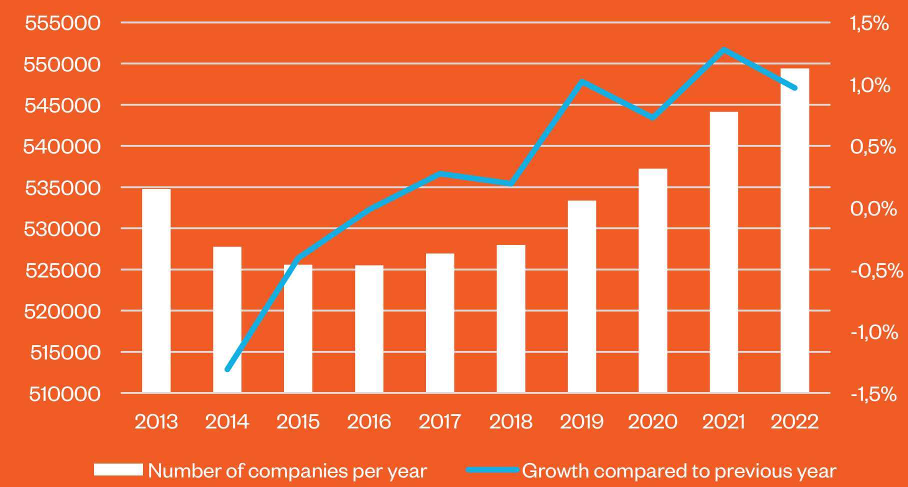
Table 7: Used variables in the research, for complete overview see Appendix B (own table)

Ordinal	Nominal	Liniear	
Urban density	Topsectors	Distance to public transport	Growth factor
Education level	CBS sectors	Distance to education	Enrichtment ratio
Age	CBS section	Distance to businesspark	Location Quotient
		Relocation distance	Relatedness
		Population density	

Scale ups (n = 15.777)



Companies (n = 961.352)



4 Results

This chapter presents the empirical findings of the study and provides the first systematic, data-driven examination of the spatial behaviour of scale-ups in the Netherlands. Addressing the central research question, “What spatial dynamics explain the geographical distribution of scale-ups in the Netherlands over time?”, the analysis follows the retroductive approach outlined in Chapter 3, presenting observable spatial patterns from which underlying dynamics may be inferred.

Building on the theoretical framework developed in Chapter 2, the chapter begins by examining how the geographical distribution of scale-ups has evolved over time using longitudinal GIS-based spatial analysis. This is followed by an exploration of scale-up-specific factors that may influence locational choices. The chapter concludes with an analysis of sectoral specialisation to illustrate how different types of scale-ups interact with existing economic structures. Interpretation of the underlying causal mechanisms is developed in Chapter 5.

4.1 Geographical distribution of scale ups

To trace how the geographical distribution of scale-ups evolved over time, three spatial analyses were applied: Ripley’s K-function, the Global Moran’s I, and the Getis–Ord Gi* hotspot analysis. Ripley’s K-function confirms a clustering pattern of scale-ups but the inhomogeneous K-function indicates that much of this concentration can be explained by background population and general business density. In other words, scale-ups largely follow existing economic geography rather than forming entirely new clusters when analysed over all the sectors.

The Global Moran’s I provides a statistical perspective at the municipal level that complements the pattern identified by Ripley’s K-function. Whereas Ripley’s K-function assesses the spatial behaviour of individual scale-ups, the incremental spatial autocorrelation aggregates these dynamics to the level of municipalities. Moran’s I z-scores remain positive across all years and distance bands, consistently peaking at around 26 at approximately 64 km. The results point to strong and significant spatial autocorrelation at the regional scale. Municipalities with high scale-up activity are generally surrounded by other high-performing municipalities. This implies that scale-up dynamics are embedded within broader regional innovation systems and shaped by inter-municipal linkages, rather than operating in isolation.

Building on this, a Getis-Ord Gi* hotspot analysis was conducted using a clustering distance of 64 km (the peak identified by the Global Moran’s I). By applying both absolute measures and relative measures (scale-ups per 1,000 firms), the analysis provides a more localised view of spatial concentration. Between 2014 and 2022, the number of scale-ups increased most strongly in the outer Randstad areas, while their relative share rose in eastern provinces such as Gelderland and Overijssel. This pattern suggests a gradual diffusion of scale-up activity beyond traditional core regions, even though the main economic centres remain dominant in absolute terms.

> “This pattern suggests a gradual diffusion of scale-up activity beyond traditional core regions”

4.1.1 Emerging locations

To further elaborate on the hotspot analysis, a trend analysis was conducted, shown on the left-hand page. This analysis presents the spatial trend analysis of scale-ups in the Netherlands over the period 2013–2022. The figure on the next page shows where the number of scale-

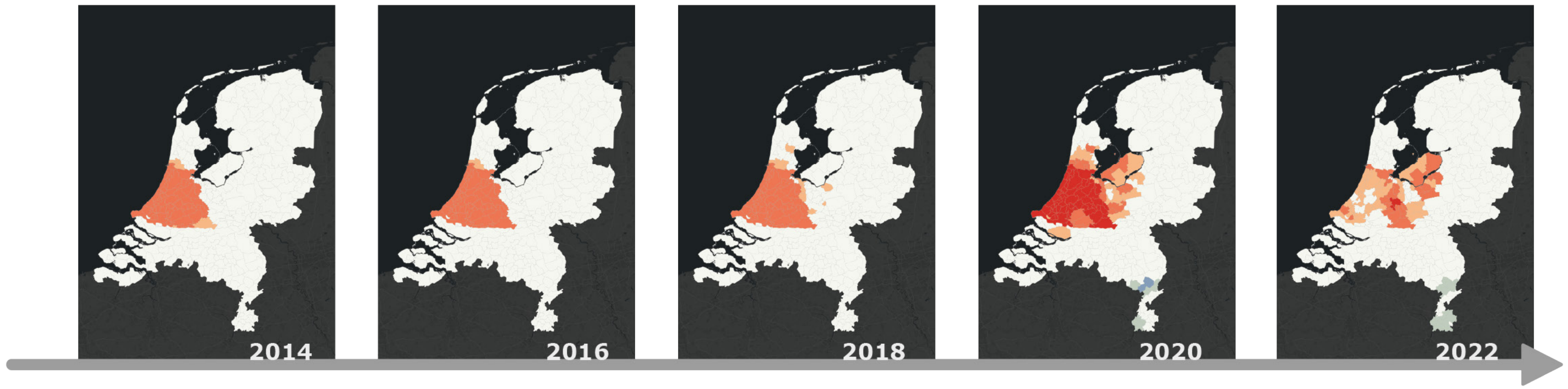


Figure 6: Hotspot analysis absolute number of scale-ups with shifting hotspot (own image)

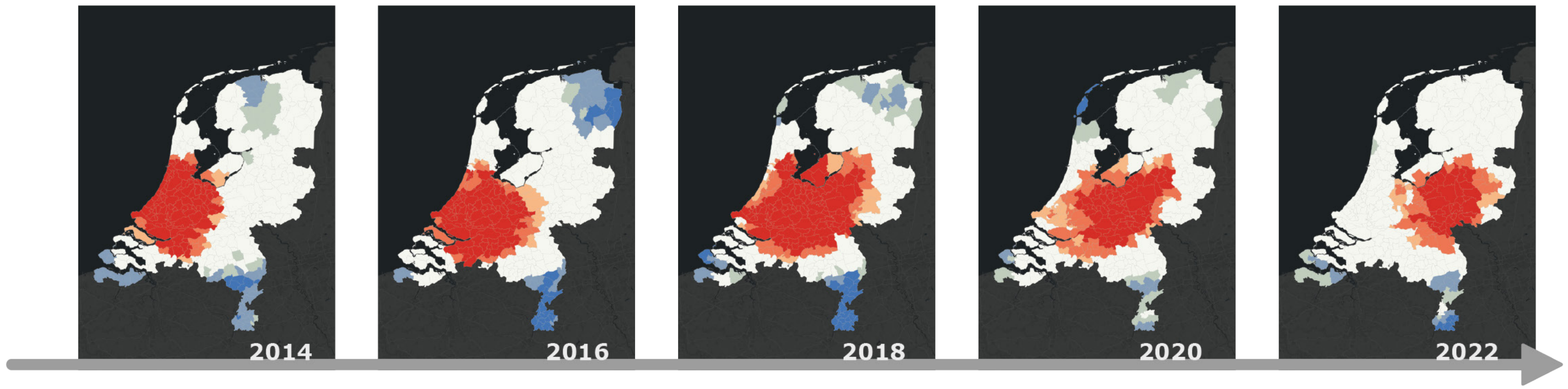
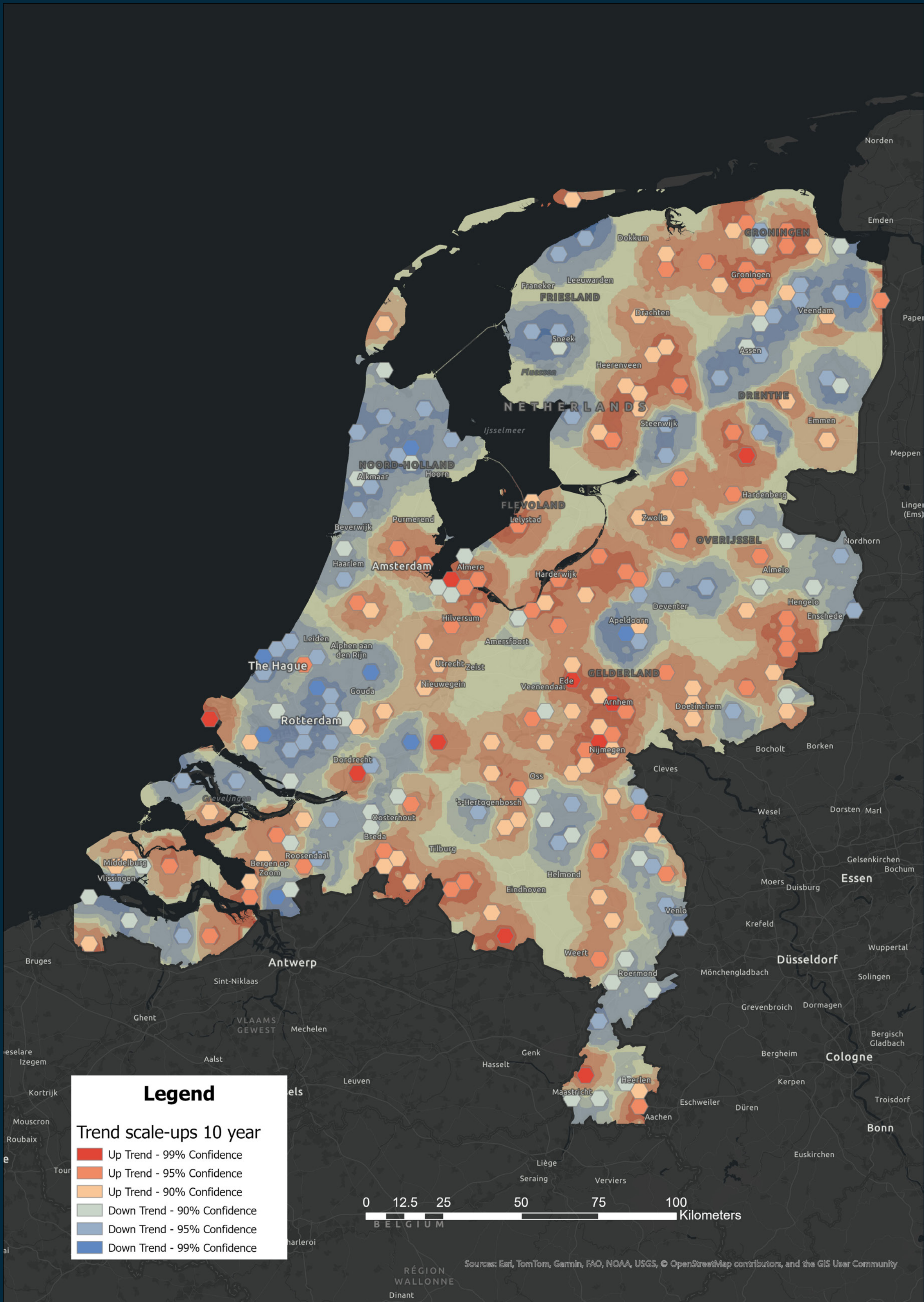


Figure 7: Hotspot analysis relative number of scale-ups per 1000 companies with shifting hotspot (own image)



ups is statistically significantly increasing or decreasing, and where no significant change is observed. The analysis was carried out at the national level, with a spatial resolution of 20 km², allowing regional patterns to be identified without zooming in on individual locations. Only the hexagons shown are statistically significant. The colour gradient is derived through interpolation and is used solely for visualisation purposes.

One striking pattern is that parts of South Holland show a statistically significant decline in the number of scale-ups over the past ten years. This applies in particular to areas within and around the traditional urban core. This downward trend contrasts with parts of eastern Netherlands, where a clear and significant increase in scale-ups is visible. In provinces such as Gelderland and Overijssel, multiple areas display a positive trend, varying in strength and level of significance.

At the same time, the figure shows that a large part of the Netherlands is characterised by neutral zones: areas where no statistically significant increase or decrease in scale-ups is observed over the study period. These areas exhibit a relatively stable pattern, indicating spatial continuity in the presence of scale-ups. The spatial dynamics therefore do not manifest as an overall reshuffling of economic activity, but rather as a combination of regional shifts and structural stability.

4.1.2 Relocation of scale-ups

In examining the geographical distribution of scale-ups, it is equally important to analyse their relocation patterns. Figure 8 presents a representative graph showing the number of relocations in each year relative to 2013 and 2017, which are representative for the other years. The figure indicates that the number of relocations decreases after firms become scale-ups. This suggests that once scale-ups have secured an appropriate location, they tend to relocate less frequently. At the same time, it is notable that many scale-ups do relocate at least once, which may point to the need for flexible real estate contracts or to the fact that fast-growing firms require the option to move when necessary. It may also imply that relocation is a normal part of their growth trajectory.

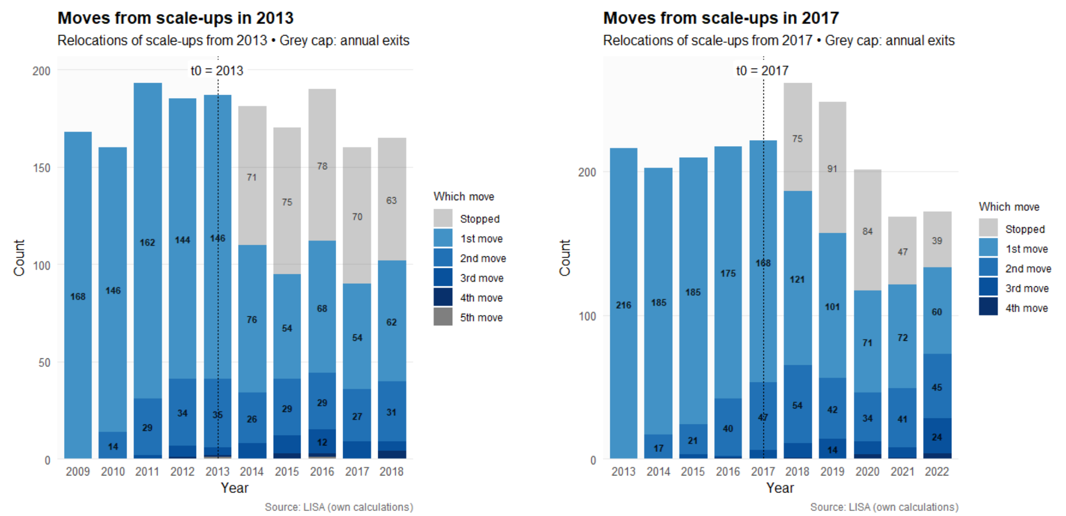


Figure 8: Relocation of scale-ups from 2013 (left side) and 2017 (right side), the grey caps represent annual exists (own image)

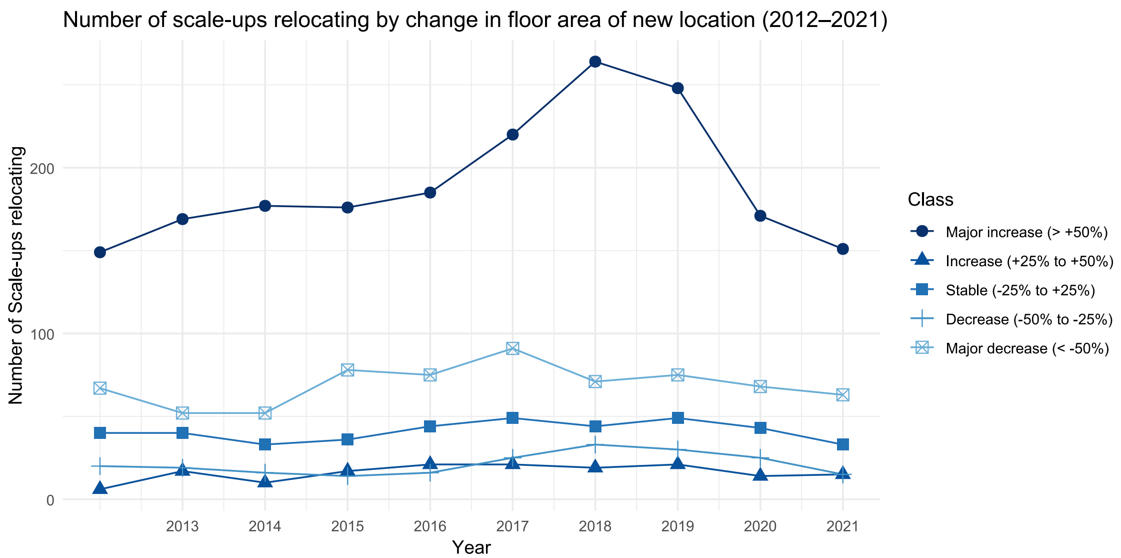


Figure 9: Number of scale-ups relocating in one year window grouped per relative change in floor area of the new location 10 year overview (own image)

To analyse how these companies relocate, the study specifically examined the year in which a firm became a scale-up, as well as the preceding and following year, in order to avoid imposing an overly rigid temporal boundary. Figure 9 shows whether firms moved to a larger or smaller location during this period. The results indicate that the majority relocated to larger premises. In addition, the impact of the COVID-19 pandemic is visible in the notable decline in relocations in 2020.

Another reason for relocation could be that there is no power available at the existing location. As one interviewee illustrated:

> **"A different location can also be a way to obtain power. [...] Because a greenfield location often has no power, but a brownfield location does. And if they take over something from another company, they can sometimes share the power connection. There are even examples of start-ups/scale-ups establishing themselves at a larger company so that they have access to power.**

This is a possible explanation for the relocation of scale-ups and is also in line with the Boston Consulting Group (2024) report, which points to the shortfalls in turnover due to grid congestion. This then relates back to the need for adequate infrastructure as boundry condition for economic activity

4.1.3 Relatedness vs unrelatedness

When comparing the trend analysis with the relatedness and unrelatedness, it can be seen that scale-ups are more found in related regions. Unrelatedness appears to be less important, as these areas more often correspond to locations experiencing decline in the trend analysis. This suggests that scale-ups benefit from a certain degree of sectoral or knowledge relatedness. Such environments are increasingly found outside the Randstad, indicating that favourable relatedness conditions are not confined to the traditional economic core. On the right side both the related variety (top one) and unrelated variety (bottom one) are shown on municipality level

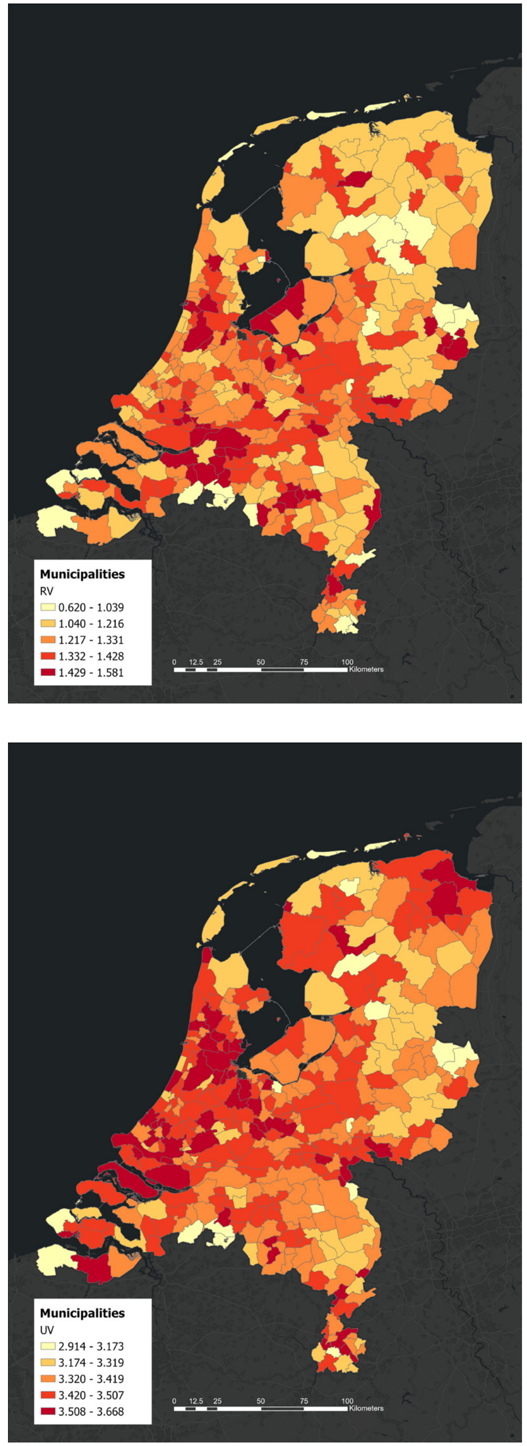


Figure 10: Related (above) and unrelated (below) variety per municipality (own image)

4.2 Scale-up specific factors

Scale-up location decisions reflect a combination of established drivers identified in the literature and newly observed patterns emerging from the quantitative analysis and interviews. The following subsections synthesise these influences into a unified narrative explaining how spatial and socio-economic conditions jointly shape the geography of Dutch scale-ups. The identified factors strongly correlate with those reported by PBL (2017), which highlights human capital, an attractive living and working environment and good accessibility as key drivers of economic growth.

4.2.1 Spatial factors

Among firms with more than 10 FTEs, scale-ups exhibit different spatial patterns compared to other companies when activities are classified into space-intensive and office-based sectors based on SBI section letters. Space-intensive activities include sections A to I, while office-based activities include sections J to U.

For office-based firms, the differences in floor area between scale-ups and other companies are relatively limited. Office-based scale-ups have a median BAG floor area of 788 m², compared to 825 m² for other office-based firms. The interquartile ranges largely overlap, indicating that most office-based scale-ups operate within spatial configurations similar to those of other established firms, despite their higher growth dynamics.

In contrast, clear differences emerge for space-intensive activities. Space-intensive scale-ups occupy substantially larger floor areas than other space-intensive firms with more than 10 FTEs. The median floor area of space-intensive scale-ups is 1.314 m², compared to 835 m² for other firms in the same activity type. This difference is consistent across the distribution,

Table 8 : Descriptives on BAG floor area compared to other companies with more than 10 FTE's (own table)

	n	Min	P25	median	P75	Max	Mean	Std. Dev.
BAG floor area scale-ups (office based)	6507	20	326	788	2048	278649	3405	10837
BAG floor area scale-ups (space intensive)	9007	20	446	1314	3501	899877	4316	17679
BAG floor area other companies (> 10 FTE's) (office based)	74649	20	301	825	2168	999999	3186	11780
BAG floor area other companies (> 10 FTE's) (space intensive)	82893	20	267	835	2244	899877	2896	11135

with higher values at both the lower and upper quartiles. These results indicate that scaling in space-intensive sectors is associated with a markedly greater demand for physical space than is the case for other firms, highlighting the stronger spatial implications of growth in production- and logistics-oriented activities.

This spatial footprint becomes particularly relevant when combined with observed relocation behaviour. Figure 11 highlights the recent relocation behaviour of scale-ups in the year they attain scale-up status, covering a ten-year period, covering the relocations that happen the year before and after. When examining the BAG floor area of the new premises to which these firms relocate, it becomes apparent that most scale-ups (56%) move to larger spaces. Across the observed years, the median increase ranges between approximately 1.400 and 1.600 m², while decreases (21% of the scale-ups) typically fall between 1.500 and 2.000 m². However, when assessing the relative change, it becomes clear that cases categorised as major increases involve particularly substantial proportional growth in floor area.

The need for floorspace can be connection to the behaviour that scale-ups are often located on business parks. Both the mean and median distances to business parks show a clear spatial proximity, and 56 percent of scale-ups are located on business parks compared to only 23 percent of firms with more than two employees, see Figure 12. The concentration of scale-ups on these sites suggests that business parks provide the spatial flexibility and operational continuity that scale-ups seek when navigating rapid growth phases. Although the current dataset does not distinguish between types of business parks, the consistent spatial relationship across regions underscores their role as key environments for supporting scale-up development. There is a difference between COROP regions but especially outside the Randstad the share on business parks (dark blue) is relatively big.

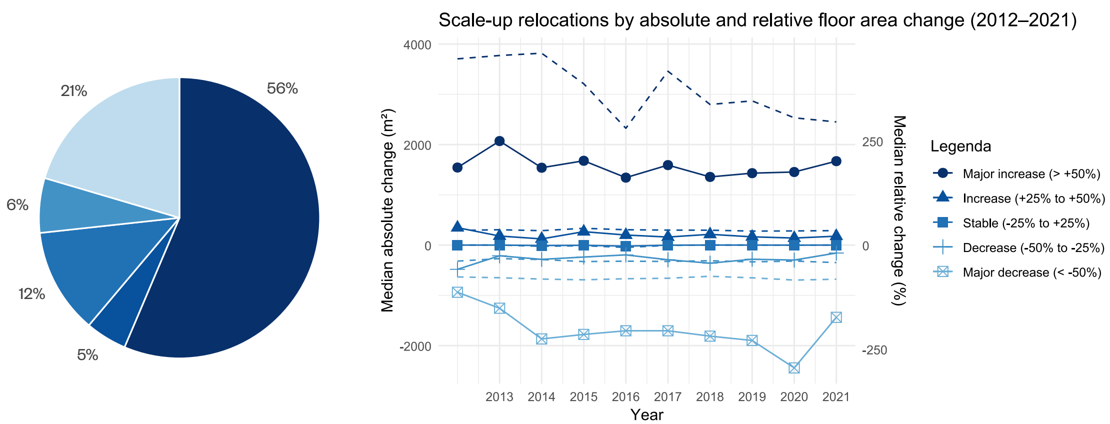


Figure 11: Share of scale ups that move to a new location and if that location is an increase or decrease in floor area, the dotted line is the relative change (own image)

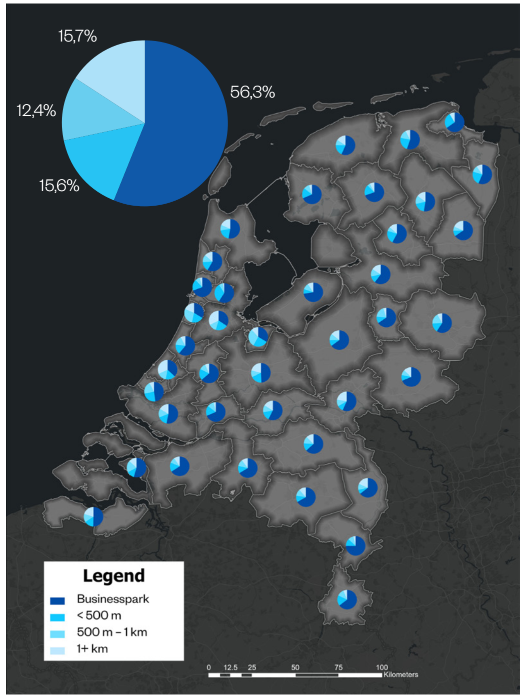


Figure 12: Share of scale-ups on business parks per COROP area and top left the national average (own image)

The literature also described by the need of adequate public transport and transportation infrastructure. However in the quantitative data there was no difference between scale-ups and other business.

4.2.2 Socio-economic factors

The quantitative and qualitative findings show that socio-economic characteristics strongly shape where Dutch scale-ups locate. Literature and interviews underline the pivotal role of human geography in shaping location choice. A interviewed firm indicated that their current location primarily reflects where the founders and early employees live.

> "This is simply because we live, work, and operate here, and that applies to all employees. In the Netherlands, it's very common that you live near your work, or actually the other way around: you look for work close to where you live" (Interviewee A)

In the Dutch context, long-distance relocations are uncommon because they would likely disrupt employee retention.

This finding highlights that the residential distribution of the workforce can outweigh more traditional spatial-economic considerations such as accessibility or cost. In Table 9 are is shown the correlation of different socio economic factors. Each factor has direct spatial implications, which are explicitly described below.

Table 9: Pearson correlation coefficients between scale-up activity and key socio-economic variables (own table)

	Share of business services	Population density	Urban density	Education level low	Education level medium	Education level high	Percentage < 45 years	Percentage > 45 years
Scale ups 10 year	,217***	,435***	,629***	,898***	,925***	,933***	,599***	-,511***

Note: * < 0,05; ** < 0,01; *** < 0,001

Business services environment

Even though in literature a strong correlation was described between business services and startup and scale ups (Leendertse et al., 2022; Stam & van de Ven, 2019), The share of business services is only weakly correlated with scale-up activity ($r = 0.217$, $p < 0.001$). Since business services are not dominant predictors, scale-ups do not require specialised office districts. Instead, they can operate in municipalities that don't have huge amount of business services, as long as basic support services remain accessible.

Education level

Scale-up numbers correlates strongly with all types of educational levels ($r = 0.898 - 0.933$, $p < 0.001$). This emphasises the central role of human capital in supporting high growth companies, which depend on specialised skills or knowledge-intensive labour. The right level of education implies the presence of relevant educational institutions, applied science institutions and research centres. Investments in educational and/or knowledge institutions for that region are an investment in improving expected income and/or employment opportunities. Literature shows that the location of such an institution often results in an interesting pool of skilled personnel that scale-ups, which often seek a specific business profile, can make use of because people tend to stay in that area (Sá et al., 2004). Municipalities that want to attract scale-ups therefore need sufficient spatial capacity for educational campuses, innovation districts and collaborative environments where research and industry can meet.

Age of the population

Scale-up activity is strongly negatively correlated with the share of residents aged over 45 ($r = -0.511$, $p < 0.001$) and positively with younger populations ($r = 0.599$, $p < 0.001$). Municipalities that have a general younger population therefor tend to have a higher share of scale-ups. Younger populations generally require compact and affordable housing formats (e.g. starter homes, rental flats, co-living) and urban amenities tailored to early-career lifestyles. Municipalities could therefor focus on facilitating residential typologies and neighbourhood qualities that appeal to younger workers.

Urban density

Scale-up activity correlates strongly with urban density ($r = 0.629$, $p < 0.001$), while the correlation with population density is lower ($r = 435$, $p < 0.001$). This could imply that it is not the sheer number of people in an area that matters, but rather the quality of the urban environment and the types of interactions it enables.

> "But essentially, urban density is beneficial when hiring people, because people prefer to be close to public transport and easy access. So, good parking spaces for free, and those are all little things. And they are all available here, so that is a major advantage of the location." (Interviewee A)

Dense urban settings offer agglomeration advantages such as knowledge spillovers, fast access to complementary firms, and exposure to diverse amenities intensity (Boschma, 2005; Rosenthal & Strange, 2020). Conditions suitable for scale-up development. Urban externalities such as mixed-use environments and short travel distances are beneficial (Meijers & van der Wouw, 2019) and inherently spatially produced. Municipalities that seek to support scale-up activity therefore could focus on land-use strategies that integrate housing, workspace, services and amenities within compact, walkable environments. However it should be noted that this environments often already exist and are hard to create in non-urban environments. The focus of this observation is more on the fact that urban environments are suitable locations and population density doesn't have a big of an influence and therefor the amenities are the main focus.

Real estate pricing and contracts

The qualitative overlay, in Figure 13, of regional real estate prices with the spatial distribution of scale-ups indicates that concentrations of scale-ups frequently occur in areas where business premises are relatively affordable. Although scale-ups are also present in higher-cost regions, the overall pattern suggests a degree of price sensitivity.

Municipalities can respond to this by providing or preserving affordable business premises, such as brownfields or urban-edge business parks. Given the current empirical basis, contractual flexibility should be considered a supporting rather than dominant spatial driver, but it may play a meaningful role in enabling scale-ups to manage growth-related uncertainty.

4.2.3 Overview factors

To summarise the findings, Figure 14 presents an integrated overview of the identified factors. The figure distinguishes between literature-based factors (orange) and empirically derived factors (red) and provides an overview of the boundary conditions identified in both the literature and the empirical analysis.

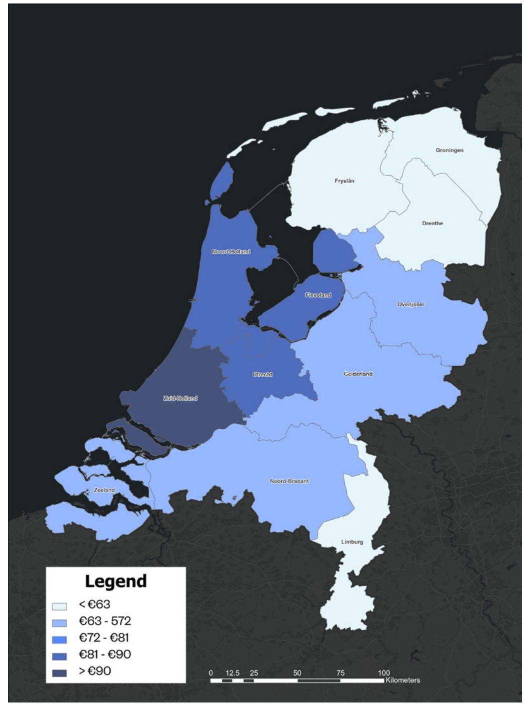


Figure 13: Average rent prices for business space (NVM, 2023)

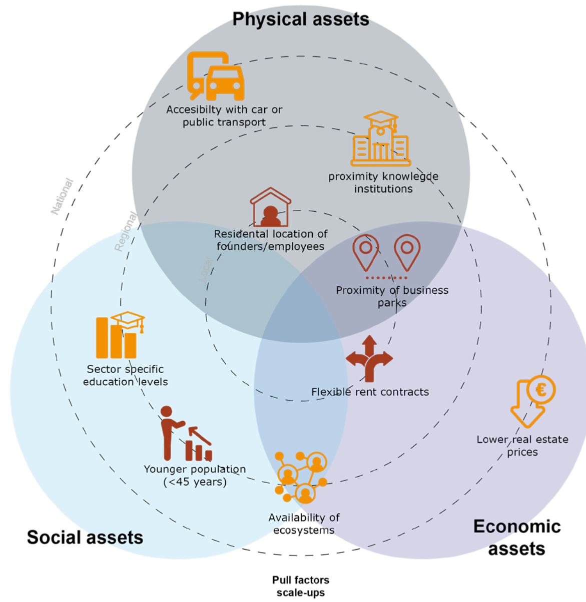
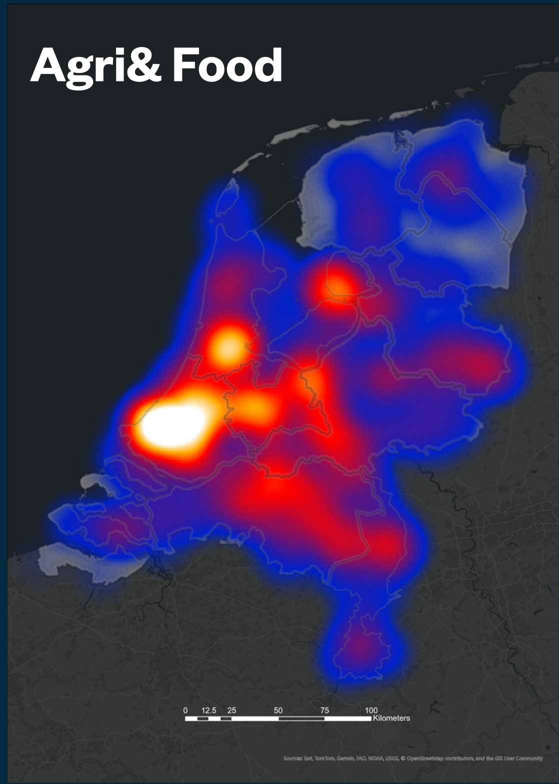


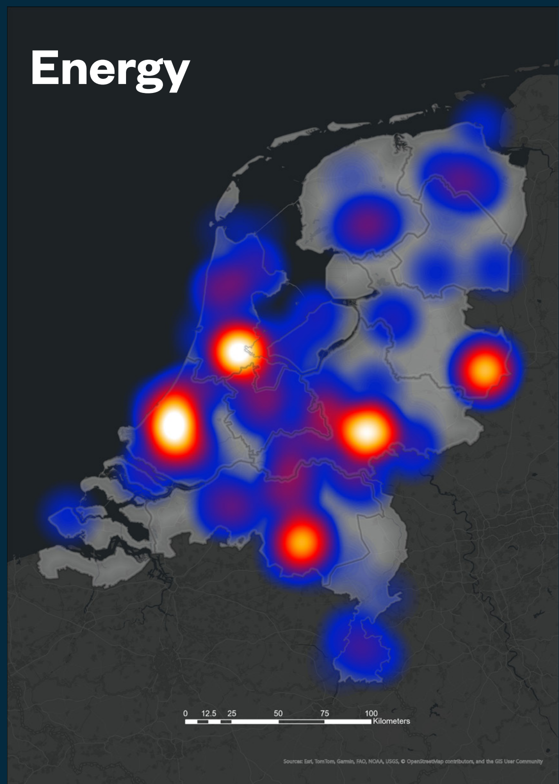
Figure 14: Scale-up-specific factors shaping locational choice with literature based and empirically based factors (own image)

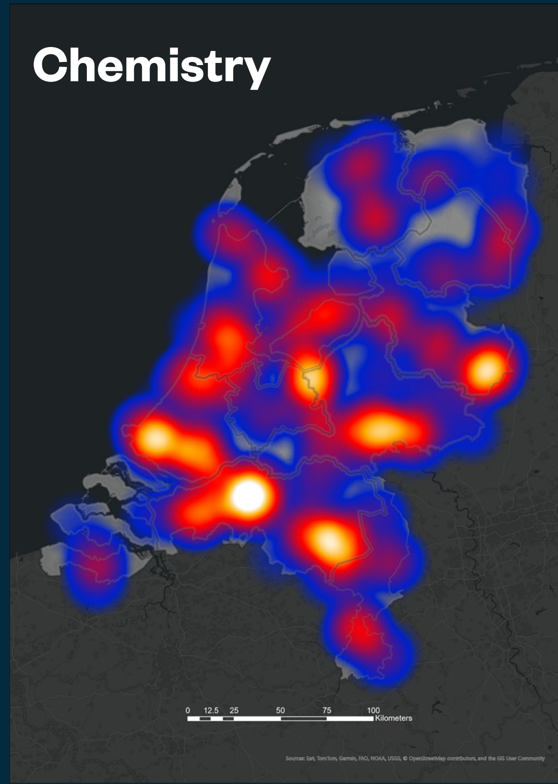
4.3 Sectoral factors of scale-ups

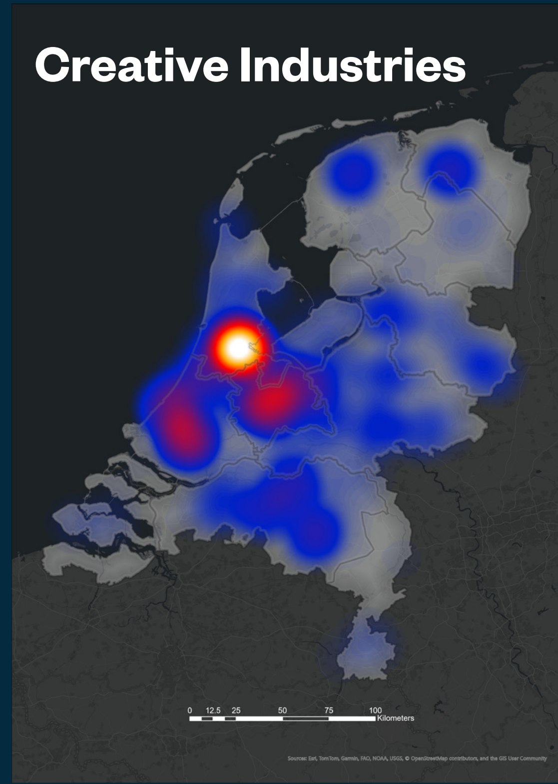
There are strong sectoral differences in how Dutch scale-ups are distributed across space. Some sectors depend heavily on proximity to knowledge institutions and the skilled workforce these environments attract, while others are primarily shaped by market location, land availability or are more bound to environmental constraints.

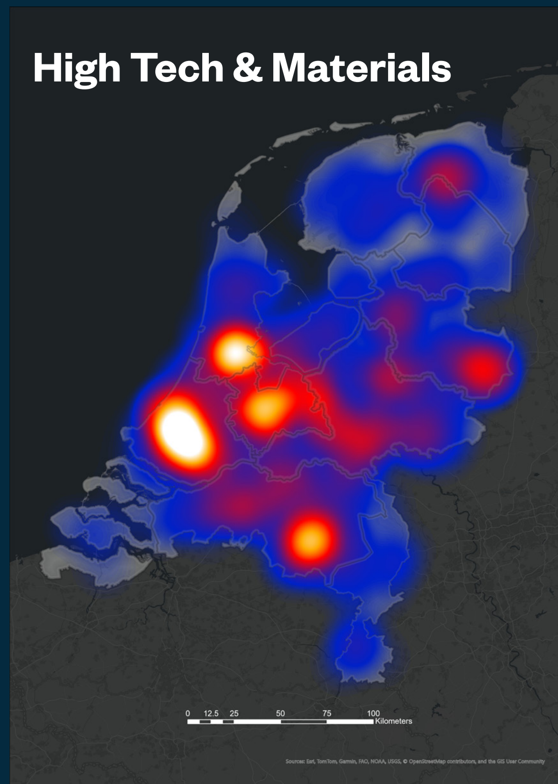
In the following figures is given an overview of the concentration of the different top sectors. In this figures it is shown that specific sectors have specific geographical locations. Some sectors like Agri&Food and Chemistry are a little bit more divided however still show certain concentrations. Other sectors have specific locations where there concentration is high.

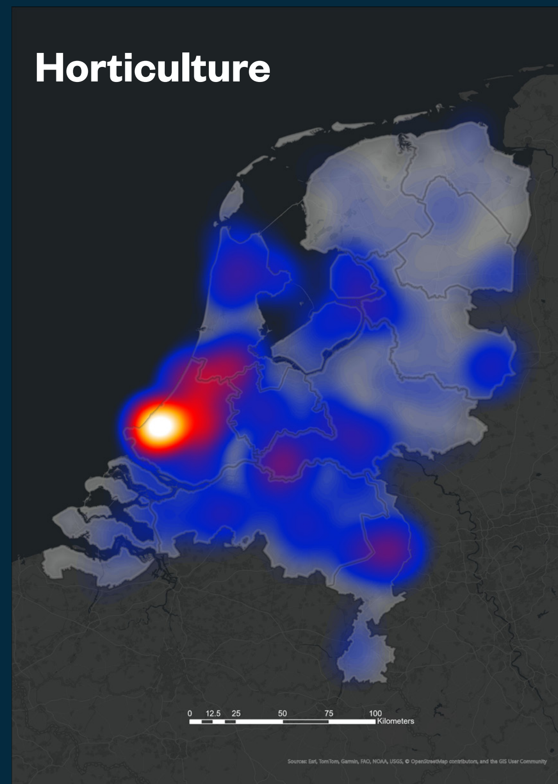


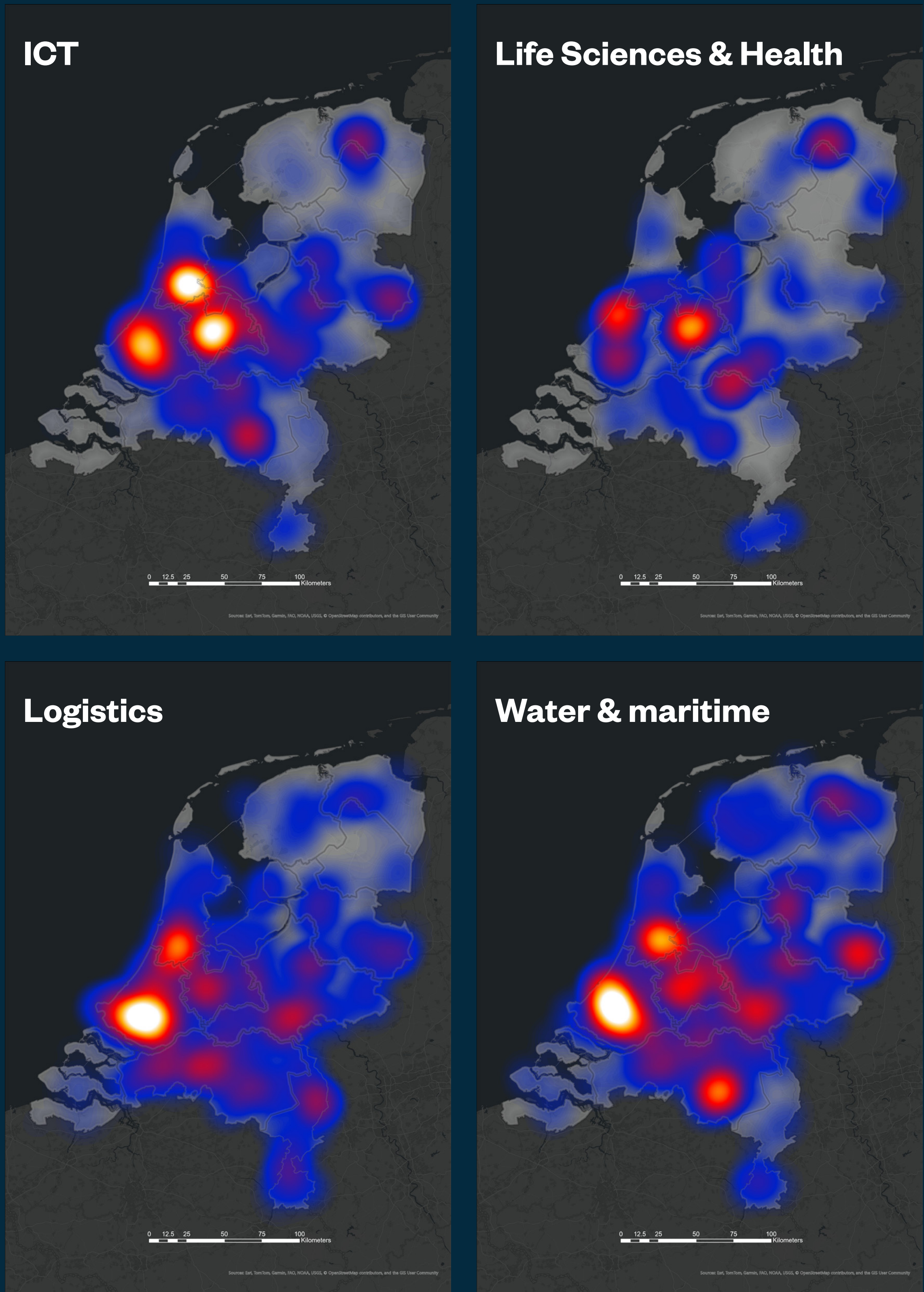












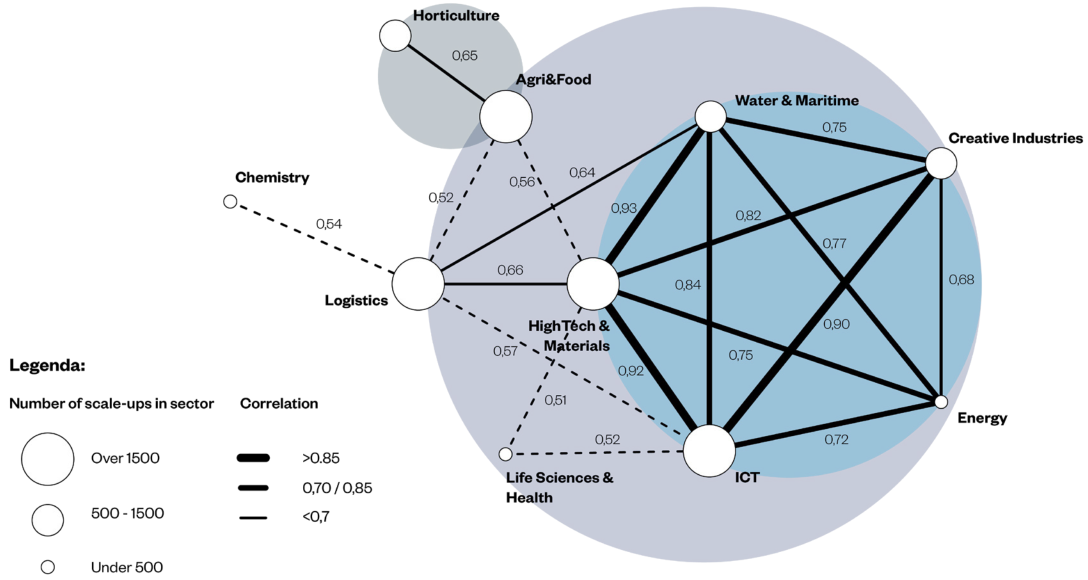


Figure 15: Correlation analysis between number of scale-ups in a municipality and different sectors over the last 10 years. Purple is those sectors that correlate > 0,5 with non-top-sector scale-ups (own image)

4.3.1 Relatedness of sectors

Figure 15 visualises the relationships between the number of scale-ups per sector across 345 Dutch municipalities. Only correlations above 0,5 are shown. The dotted lines represent correlations above 0,5 but with a low R-squared value. This analysis reveals two key insights.

First, the horticulture and chemistry sectors appear to be relatively isolated sectors in terms of their relationships with scale-up numbers in other sectors across municipalities. The purple circle highlights all sectors that show a strong correlation with the total number of scale-ups in a municipality and the sectors in the blue circle exhibit even higher correlations than those positioned at the edges of the purple cluster.

Second, a clear cluster emerges among the High Tech, Water & Maritime, Creative Industries, Energy, and ICT sectors. These sectors display notably high mutual correlations (r ≈ 0,68–0,93), suggesting that they tend to concentrate together within the same municipalities. This clustering may relate to shared knowledge bases and overlapping technological capabilities. The strong correlation between the sectors could point to the fact that they benefit from knowledge spillovers that come from geographical proximity.

The most important takeaway is that two sectoral dynamics become visible. The first is a dynamic driven by knowledge exchange, reflected in the tightly correlated cluster of technologically related sectors in blue. The second is a more separate dynamic, where certain sectors are less correlated with others and therefore operate in a more independent or sector-oriented manner.

4.3.2 Sector dependent factors

In the results four sectoral dynamics can be distinguished. The social-economic dynamic is based on education, age, and the urban environment. In Table 10, the Pearson correlation is shown. It indicates that four

Table 10: Pearson correlation coefficients between scale-up activity and key socio-economic variables, with subgroup analysis for top sectors (own table)

	Education level low	Education level medium	Education level high	Urban density	Percentage < 45 years	Percentage > 45 years
Scale ups 10 year	,217***	,435***	,629***	,898***	,925***	,933***
Agri&Food	,570***	,592***	,538***	,337***	,455***	-,468***
Chemie	,486***	,492***	,353***	,244***	,300***	-,242***
Creative industries	,798***	,806***	,932***	,559***	,447***	-,359***
Energy	,679***	,694***	,738***	,531***	,517***	-,388***
High Tech	,846***	,876***	,881***	,618***	,603***	-,504***
Life sciences & Health	,428***	,469***	,501***	,389***	,459***	-,360***
Logistics	,706***	,703***	,575***	,390***	,386***	-,329***
Horticulture	,176**	,192***	,137*	,073	,166**	-,181***
Martime & Water	,836***	,855***	,835***	,614***	,592***	-,491***
ICT	,812***	,840***	,932***	,626***	,566***	,-473***

Note: * < 0,05; ** < 0,01; *** < 0,001

sectors are strongly dependent on the educational level or age composition within a municipality, and they tend to thrive where these characteristics are present. In addition, these scale-ups benefit from higher urban density and the agglomeration effects of sharing and matching (Duranton & Puga, 2004), which may suggest that they are often located in more urbanised areas. Education levels (low, medium, high) are closely interrelated but vary by sector. In some sectors, such as High Tech and ICT, higher education correlates most strongly with scale-up activity. In others, such as Logistics, scale-ups are more associated with medium or lower education levels, reflecting the operational nature of work. The High Tech, ICT, Water & Maritime and Creative Industries sectors display particularly strong correlations with urban density ($r = 0.559–0.626$, $p < 0.001$).

The knowledge and network dimension highlights how sectors cluster spatially due to knowledge spillovers, proximity to knowledge institutions, and access to shared labour pools. In particular, the Creative Industries, Energy, High-Tech, and Maritime sectors are strongly represented in Delft, Rotterdam, and Eindhoven. These sectors also display a high degree of correlation at the municipal level: an increase in one sector is associated with a higher likelihood of the others being present as well. This pattern likely reflects the influence of nearby universities and technical institutes, although the effect appears to stem less from the institutions themselves and more from the people they attract. Many founders and employees originate from these cities or remain after studying there, reinforcing the link between academic ecosystems and entrepreneurial activity. As one interviewee illustrated:

> **The way it works is that you institutionalise from the university to a place nearby. Because, yes, people who have been involved from the start all have at least one thing in common. They are all active in the city. Not through their studies or anything like that anymore, but now we've moved on a bit. Initially, though, that's where it all started, and that's how they are. I didn't do it myself, but I'm here for the others. The founders are, so to speak, the ones who ended up here." - Interviewee A**

While proximity to universities facilitates knowledge exchange, interviews suggest that human capital itself, graduates and researchers (or potential employees), is even more decisive than the institutions.

Sectoral orientation is evident in four sectors. As seen in the heatmap and Figure 15, these four sectors sit somewhat apart and do not cluster closely with the others. Logistics, Horticultere and Life Sciences & Health sectors operate within broader market ecosystems. Logistics scale-ups cluster around Rotterdam and border regions, driven by transport and trade infrastructure next to that they also focus on the east with the infrastructure corridor to the east. Life Sciences & Health firms concentrate around Leiden, Utrecht, and Wageningen, where hospitals, research institutions, and specialised suppliers co-locate. Also in later results when connecting enrichtment ratio it is shown that the concentration of Life Sciences & Health is strongly influence by the fact that the tend to house in regions where the local specialisation is also Life Sciences & Health. The Horticulture sector remains concentrated in the Westland, reflecting its strong market dependency of the greenhouse horticulture.

Spatial and environmental requirements vary considerably between sectors. Scale-ups in the Chemistry, Energy, Life Sciences & Health, and Logistics sectors require significantly larger premises than others. These firms typically occupy spacious industrial plots. Chemistry and Logistic scale-ups stand out because of their spatial and environmental requirements. Both sectors have a relatively high environmental footprint and are therefore predominantly located on business parks is shown in Figure 16. Next to that some of the sectors are also dependent on specific environmental zoning, this is illustrated in Figure 17. An in combination that the sector is less dependent on highly educated labour, which results in a more dispersed

Extra space need when compared to companies with more than 10 FTE (830 m²)

~261%
Extra needed for Life Sciences & Health (2996 m²)

~234%
Extra needed for Chemisty (2773 m²)

~136%
Extra needed for Energy (1962 m²)

~134%
Extra needed for Logistics (1945 m²)

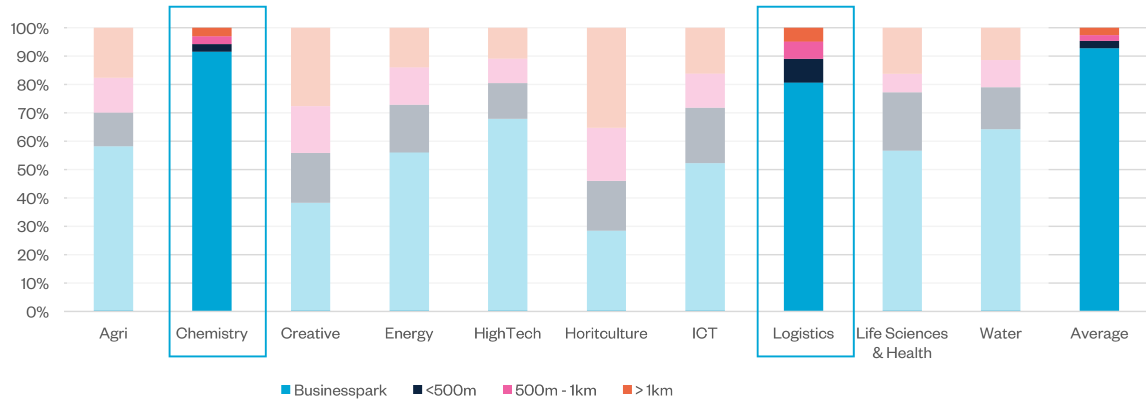


Figure 16: Distance to businessparks per top sector and national average (own image)

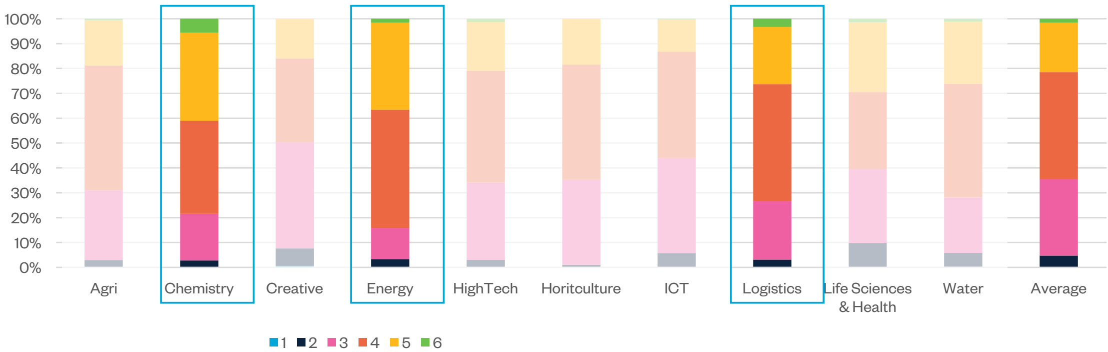


Figure 17: Distribution of environmental zoning of businessparks and percentage of scale ups (own image)

national distribution. In contrast, the Energy sector relies on technically skilled employees, creating concentrations near cities that combine a qualified workforce with available space, such as Rotterdam/Delft, Arnhem, and Enschede. Over time, both sectors appear to be diversifying towards more peripheral areas, which may be explained by increasing spatial requirements, rising urban land prices, or the search for locations with fewer environmental constraints.

A useful rule of thumb when identifying the potential location of a scale-up is to first consider the sector. For firms outside the top sectors, location is determined mainly by spatial needs (urban versus non-urban) and the type of labour required. These firms are most often located in the municipalities where the fitting labour forces are present and where there is affordable space. As shown before the trend is going outside the Randstad for these types of scale ups. If the firm belongs to one of the top sectors, its potential locations are usually limited to a few well-established clusters. The second indicator is the educational background of the founders, which often reveals the region of establishment, typically near the university where they studied.

4.4 Networking and clustering

While the preceding sections analysed scale-ups as individual firms or sectoral units, this section shifts to the relational dimension of their spatial behaviour. Building on the clustering, agglomeration and relatedness dynamics outlined in Section 2.2.2, it examines how scale-ups are embedded within broader economic structures and networks. This includes analysing regional specialisation through Location Quotients (LQ), assessing alignment with these specialisations using enrichment ratios, identifying interdependencies between sectors through network analysis variety. Together, these relational indicators provide insight into the structural dynamics that shape the spatial distribution of scale-ups in the Netherlands and puts the focus on where scale-ups originate.

> ... it's nice to have an ecosystem, because then you can talk to people every now and then. – Interviewee B

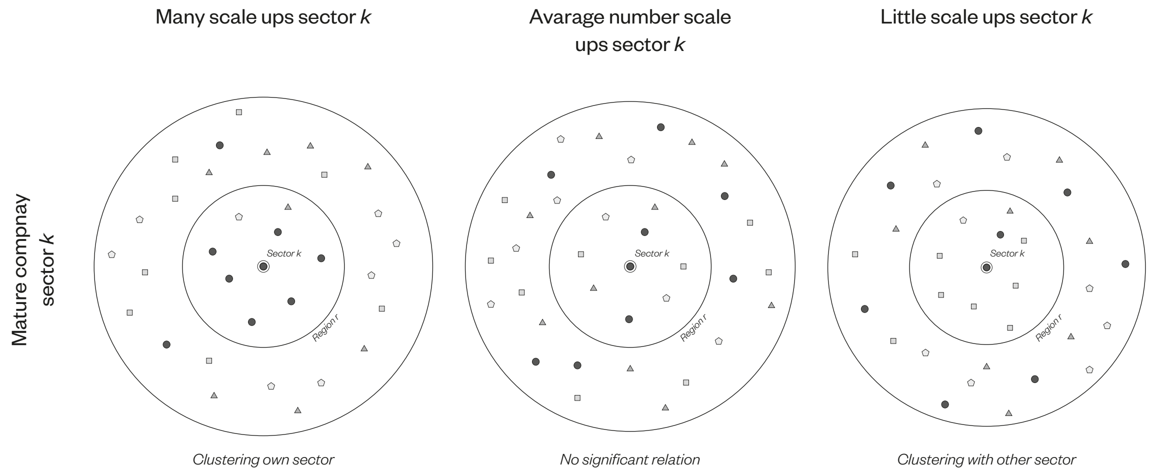


Figure 18: Schematic diagram of the way clustering is defined (own image)

4.4.1 Clusters van scale ups and mature companies

For the clustering analysis, 10 km buffers were constructed around large firms with more than 250 FTE. These buffer areas were then used to calculate the LQ for the sector of the anchor firm and the surrounding scale-ups. When the LQ of the anchor firm's sector in region r exceeds one, this indicates clustering (see Figure 18, left panel). An LQ of 1 suggests no relationship, while values below 1, shown in red, indicate that scale-ups in that sector are relatively under-represented around the large firm and above 1 are over-represented and are therefore clustered, shown in purple.

Figure 19 plots the LQ around large firms against the number of nearby scale-ups. Under perfect clustering, the points would align along the orange diagonal, reflecting that the presence of a large firm in a given sector corresponds with a

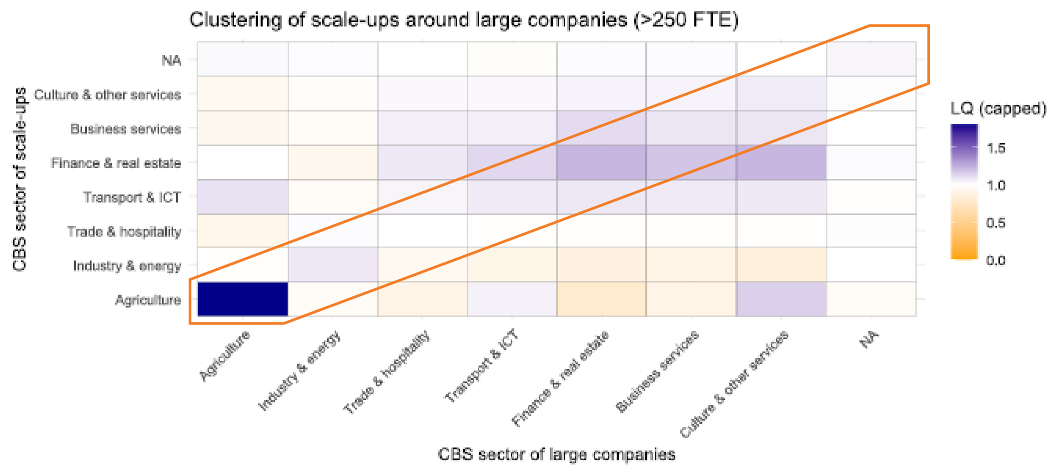


Figure 19: Heatmap of LQ buffer zones around large companies and clustering of CBS sectors (own image)

high LQ of scale-ups in the same sector. In practice, this pattern is only partially visible. Strong clustering appears mainly in Agriculture, Forestry and Fisheries and in Financial Services. Most other sectors show only weak or diffuse clustering, with scale-ups across different sectors locating around large firms without a clear sectoral match. Scale-ups in Trade & Hospitality, Manufacturing & Energy, and Agriculture & Forestry are notably under-represented around Financial and Business Services firms. Overall, the results indicate that there is no strong or systematic clustering effect. Sectoral alignment appears to play only a limited role in the location choices of scale-ups, rather than serving as a dominant locational driver.

4.4.2 Enrichment ratio

As an exploratory extension of the Location Quotient (LQ) analysis of scale-ups, this section introduces enrichment ratios to relate scale-up activity to the dominant sectoral structure of each COROP region. For each region, the dominant sector was defined as the sector with the highest LQ among incumbent firms. The enrichment ratio was calculated by dividing the LQ of scale-ups in this sector by the sectoral LQ of firms. Values above one indicate that scale-ups are relatively overrepresented in the dominant sector, while values below one indicate underrepresentation.

For each COROP region, the distribution of enrichment ratios over the period 2013–2022 is visualised using horizontal boxplots. Each boxplot shows the extent to which scale-ups follow or diverge from the dominant sectoral specialisation in that region. Narrow boxplots indicate stable behaviour over time, while wide boxplots signal volatility.

The shaded band between 0.9 and 1.1 represents a neutral zone, where scale-up activity closely resembles the overall firm population. Regions are coloured by their most frequently specialised sector, with grey indicating the absence of a consistent sectoral specialisation, and are ordered by their median enrichment ratio. Figure 22 on the next page provides a complete overview of enrichment ratios across COROP regions.

When examined more closely, several recurring patterns can be distinguished. These patterns reflect different ways in which scale-up dynamics align with existing regional specialisations and can be interpreted in terms of policy-relevant orientations: monitoring, attracting, or steering.

Regions with a median enrichment ratio above one can be interpreted as monitor regions. In these regions, scale-ups are structurally more prevalent in the dominant sector than the incumbent firm base would suggest, indicating ongoing reinforcement of the dominant sector through scale-up activity. This pattern is most evident in regions such as Leiden, Zaanstreek, Eindhoven, Zuidwest-Friesland, Amsterdam, West-Brabant, the MRDH area, the Achterhoek, and Utrecht. The relevance of monitoring in these regions lies in the strong existing alignment between dominant sectors and scale-up activity, which may intensify cluster dynamics through innovation, knowledge spillovers, or complementary activities. Monitoring enables observation of how these dynamics evolve over time, allowing responses if alignment strengthens or weakens.

A second pattern is observed in regions characterised by narrow boxplots, indicating stable enrichment

Monitor
Median above 1

Attract
Small boxplot

Steer
Median below 1 or wide boxplot

Enrichment ratios

As a proof of concept, the enrichment ratio framework for policy intervention is visualised here. The monitor regions are shown on the left, while the attract regions are displayed on the right. For provincial or national government bodies and organisations interested in the location of scale-ups, visualising trends over multiple years can support the identification of an appropriate strategy and action plan. The Monitor, Attract, or Steer (MAS) framework can subsequently be used to inform and support evidence-based policy recommendations.

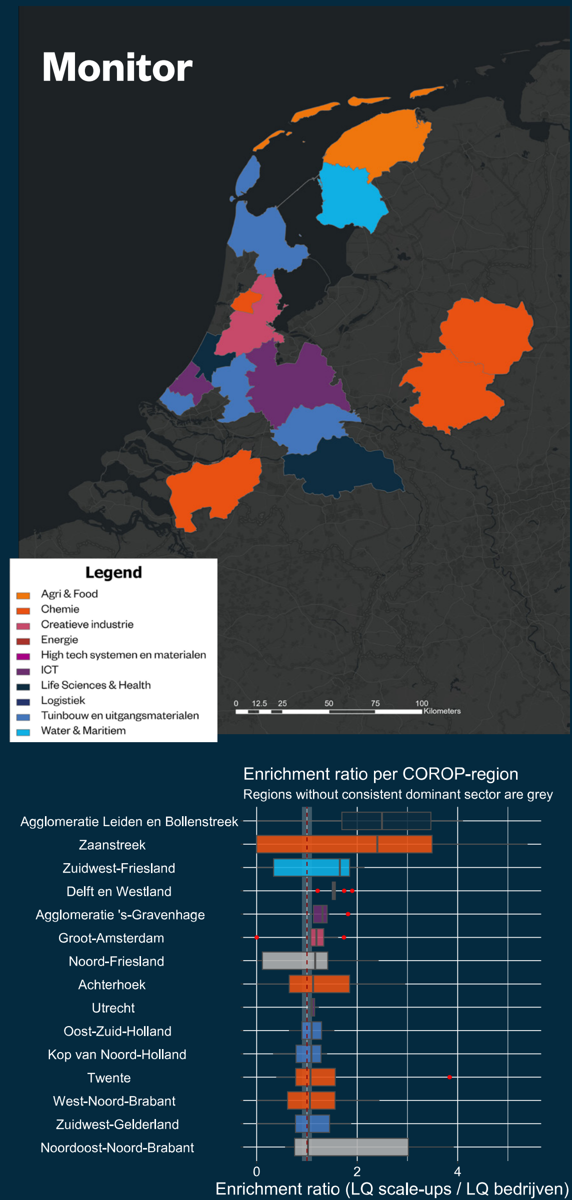


Figure 20: COROP Regions with above median 1 enrichment and dominant sector over 10 year period (own image)

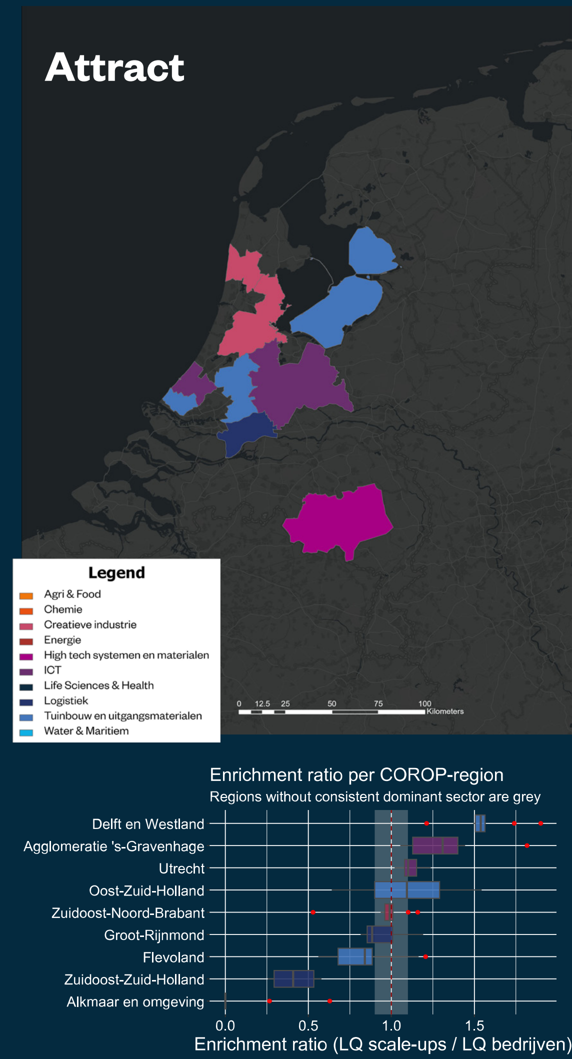


Figure 21: COROP Regions with small boxplot and dominant sector over 10 year period (own image)

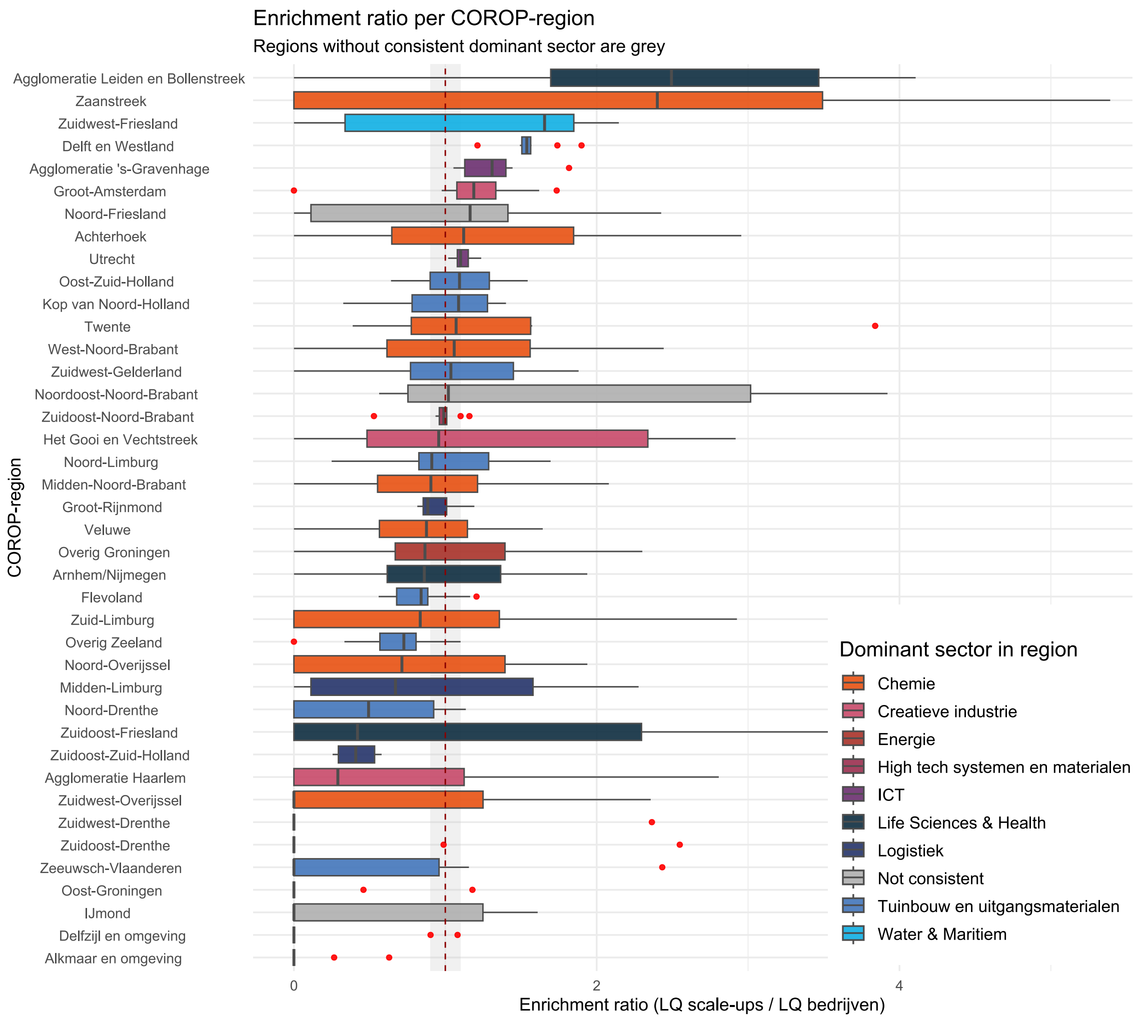


Figure 22: Complete overview of the enrichment ratio of the dominant sector per COROP area over a 10 year period. In grey COROP regions who dont have a more then 8 year consistent dominant sector (own image)

ratios over time. This stability suggests that the dominant sector consistently generates scale-ups in a predictable ratio. Such regions can be interpreted as attract regions, as their persistent and reliable specialisation profile makes them suitable for attracting activities aligned with the dominant sector. Examples include Delft and Westland (Water & Maritime), Groot Amsterdam (Creative Industries), Agglomeratie 's-Gravenhage and Utrecht (ICT), Zuidoost-Noord-Brabant (High Tech), and both Groot Rijnmond and Zuidoost-Zuid-Holland (Logistics).

Finally, regions with wide boxplots or median enrichment ratios below one reflect weaker or more volatile alignment between dominant sectors and scale-up activity. In these steer regions, scale-ups either emerge inconsistently or are underrepresented relative to the dominant sector, suggesting that existing sectoral structures do not automatically translate into scale-up formation and therefor if the region wants to attract more scale-ups it should steer in a different direction.

In some cases, such as chemistry-dominated regions, wide distributions are partly driven by

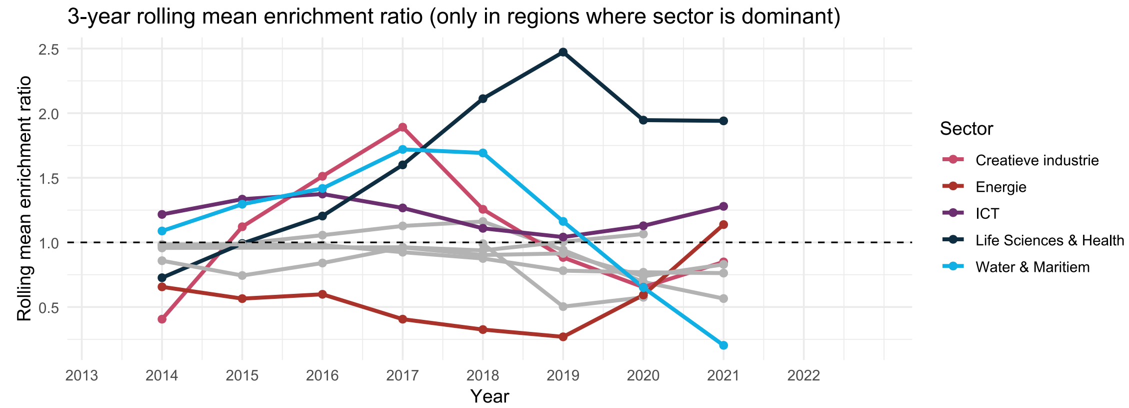


Figure 23: 3-year rolling mean enrichment ratio in regions where sector is dominant, in grey are sectors that are not relevant for this analysis (own image)

the relatively small number of scale-ups in this sector (n = 189), which increases sensitivity to year-to-year variation. These patterns indicate contexts in which steering towards alternative development trajectories or complementary sectoral strategies could be considered.

Although the enrichment ratio analysis is exploratory and illustrative, it adds a dynamic perspective to regional specialisation by showing whether regions reproduce, stabilise, or diverge from their dominant sectoral profile through scale-up activity. The distinction between monitoring, attracting, and steering does not constitute a framework or policy prescription, but illustrates how observed regional patterns may inform strategic reflection without implying causality.

Figure 23 complements the regional analysis by presenting the three-year rolling mean enrichment ratio per dominant sector. Life Sciences & Health consistently exhibits the highest enrichment levels, suggesting that regions specialised in this sector provide favourable conditions for scale-up formation. ICT shows a stable, mildly positive pattern, indicating reinforcement of existing concentrations. In contrast, Creative Industries and Water & Maritime display temporary increases between 2016 and 2018, followed by a gradual decline towards parity, while Energy remains persistently low. Overall, the figure indicates that sustained clustering of scale-ups is limited to a small number of sectors, most notably Life Sciences & Health and, to a lesser extent, ICT, while other sectors show little evidence of long-term spatial reinforcement.

5 Synthesis

In Section 2.5, Conceptual Framework, the framework introduced below was briefly discussed. In this chapter, the focus is on explaining how this framework can be applied to answer the question of what the spatial dynamic of scale-ups operates. The previous chapter addressed the individual components of the framework, this chapter further elaborates on the conceptual model by discussing its structure and clarifying how the different factors influence the dynamics. After that a quick scan of the Nota Ruimte is used to demonstrate how the framework operates across different spatial scales and time, and how it can be help to make the spatial dynamics of scale-ups visible.

5.1 General dynamics

The first part of the framework, the general location theory, helps explain why locations of scale-ups are shifting over time. The most relevant dynamics are location availability, affordability and the broader evolution of Dutch urban regions. These factors offer a partial explanation for why the geography of scale-ups is not entirely anchored in the traditional economic core and why some high-growth activity has begun to appear more strongly outside the Randstad.

The trend analysis over the ten-year period shows a gradual increase in scale-up presence in the eastern provinces. This shift is subtle rather than transformative, yet it could suggests that regions with more space, lower rental costs and right infrastructure may increasingly accommodate scale-ups. While this study does not quantify land availability or real-estate costs directly, the spatial pattern is consistent with the idea that firms entering growth stages require larger or more flexible premises, which can be more difficult to find in highly constrained urban cores.

Pressure on land and business space in the Randstad remains a defining structural condition. Competition between residential, commercial and infrastructure limits the adaptability of these areas, making expansion more challenging for firms with increasing spatial demands. This effect may be strong on some scale-ups, where as others are not effected as much.

5.2 Scale-up-specific

Another factor in the framework are the scale-up-specific location factors, which function as boundary conditions for scale-ups. These are spatial conditions that must be met for scale-ups to establish themselves in the first place. They do not necessarily provide direction, but instead determine whether locations are included or excluded.

One of the most important boundary conditions identified in this research relates to the socio-demographic characteristics of a location, municipality or region. For scale-ups

Example case

Axion ChemTech*

This illustrative case shows how the location of a fictitious scale-up can be understood through the framework. The firm operates in applied chemical processing and is founded by entrepreneurs with academic ties to Utrecht and Wageningen. At the time of location choice, limited funding and strict spatial and safety requirements are decisive.

General dynamics
High land prices and limited availability of suitable business space in the Randstad form a structural constraint. Without external funding, the firm cannot absorb high rents or inflexible lease conditions, pushing the search beyond the traditional economic core.

Networks and sector specific
Network dynamics guide the direction of this search near Wageningen. The firm is attracted to regions with existing chemical activity, where specialised infrastructure, regulatory familiarity and sector-specific knowledge are present. This draws them to Pivot Park, a Center for Open Chemical Innovation.

Scale-up-specific
This initially draws the firm towards the area near Oss, close to Pivot Park. However, the absence of a suitable building means the required boundary conditions are not met. The firm therefore relocates to Nijmegen, where appropriate facilities, zoning conditions and a compatible labour pool are available.

Final location choice
The final location emerges from the interaction of cost pressure, boundary conditions and sectoral orientation, illustrating how scale-up dynamics result from sequential spatial choices rather than a single optimal decision.

** This is an illustrative case to show how the framework works, Axion ChemTech is not a real company*

in particular, a strong correlation is found with the presence of an appropriate educational profile that aligns with the needs of the scale-up, ensuring access to a suitable workforce. This finding is also strongly supported by the literature (Peirone et al., 2024). In addition, the average age of the population is significant, especially when the mean age of a municipality is below 45. The degree of urbanisation is another key factor. The level of urbanisation and the associated amenities show a stronger correlation with scale-up presence than population density alone.

Beyond socio-demographic characteristics, the physical attributes of a location also form an important set of boundary conditions. The findings indicate that scale-ups require larger amounts of available space compared to other firms, particularly those operating in space-intensive sectors. The availability of suitable business parks, along with environmental zoning classifications that match the operational requirements of the scale-up, is therefore essential. Also available energy infrastructure could be a reason. Contrary to some findings in the literature, this study did not find evidence that scale-ups tend to locate closer to public transport hubs.

Overall, these scale-up-specific boundary conditions indicate whether a location can be considered suitable for scale-ups. Among these factors, the availability of labour, and therefore the presence of the right demographic profile, emerges as a decisive factor, supported by both the quantitative data and literature (Leendertse et al., 2022; McKinsey & Company, 2024).

5.3 Sector specific

Within the framework, the primary centripetal force is sectoral. The analysis of the full population of scale-ups reveals a clear spatial dynamic in which sectors increasingly concentrate in specific locations. This concentration results in a so-called anchoring effect, whereby scale-ups in particular sectors, and thus within specific production chains, are drawn towards certain regions.

This research identified several different anchoring factors. Across the four sector-specific factors identified, each generates a distinct form of anchoring. PBL (2017) also acknowledges the sectoral anchoring effect, noting that growth is often sector-specific, driven by specialisation in technologies and materials, and is highly context-dependent. Some sectors rely more heavily on demographic composition or levels of educational attainment, while others require proximity to research institutions or specialised suppliers. Certain activities demand substantial floor space or specific environmental conditions, thereby anchoring them to business parks or peri-urban locations. Sectoral orientation itself guides firms towards places that align with their production processes or knowledge base.

This centripetal, or anchoring, force acts as a counterbalance to the spatial dynamics identified in the trend analysis of relocations over time. These forces reveal a complex interplay that shapes the spatial dynamics of scale-ups.

5.4 Network dynamics

The final factor in the framework has a directional effect, both geographically and over time. Network dynamics are widely discussed in the literature. However, in the case of scale-ups, this study specifically examines network dynamics through the lens of the enrichment ratio, which indicates the degree of concentration of a sector within a specific region relative to the dominant sector. In this way, network dynamics reveal how certain sectors and regions become more or less specialised over time, and how concentrations of scale-ups respond to these changes.

By incorporating networks into the conceptual model, it becomes possible to address the action perspective and to explain how firms, and scale-ups in particular, embed themselves within networks. These networks may relate to agglomeration advantages such as sharing, matching, and learning, but may also involve existing value chains of which scale-ups can become a part. Networks thus provide the model with direction, and because networks evolve and decay over time, they explicitly introduce a temporal dimension into the framework.

5.5 Policy analysis

To demonstrate how the conceptual framework can be used to make the spatial dynamics of scale-ups across multiple scales visible, the Ontwerp Nota Ruimte 2025 was used as an illustrative policy reference. The objective is not to assess the effectiveness of the policy, but to show how the framework reveals spatial dynamics of scale-ups. They aren't mentioned often, but they remain largely implicit in the document.

The Nota Ruimte primarily operates at the national scale. It frames long-term structural conditions such as land scarcity, demographic change, energy transition and national infrastructure as guiding parameters for spatial development. Within the conceptual framework, these elements correspond to general dynamics. They shape the spatial envelope within which economic activity can occur, but do not explain how individual firms respond to these conditions. By applying the framework, it becomes clear that national policy establishes constraints rather than spatial outcomes, leaving the translation of these constraints to lower scales.

At the regional scale, the Nota Ruimte introduces differentiation through the principle "Elke regio telt" and through regionally specific economic orientations, such as innovation-driven ecosystems and sectoral clusters. The framework interprets this as the scale at which sector-specific anchoring becomes visible. Regional labour markets, educational profiles and production environments selectively attract scale-ups in particular sectors. While the Nota Ruimte recognises regional diversity, the framework makes explicit how sectoral anchoring stabilises spatial patterns by drawing firms into existing regional ecosystems, even under conditions of national spatial pressure.

Network dynamics connect these scales over time. Although the Nota Ruimte refers to infrastructure networks and long-term transitions, it does not explicitly address firm-level networks. The framework reveals how local interactions aggregate into regional specialisation, which in turn positions regions within national and international value chains. By incorporating networks, spatial dynamics are understood as evolving processes rather than static policy outcomes.

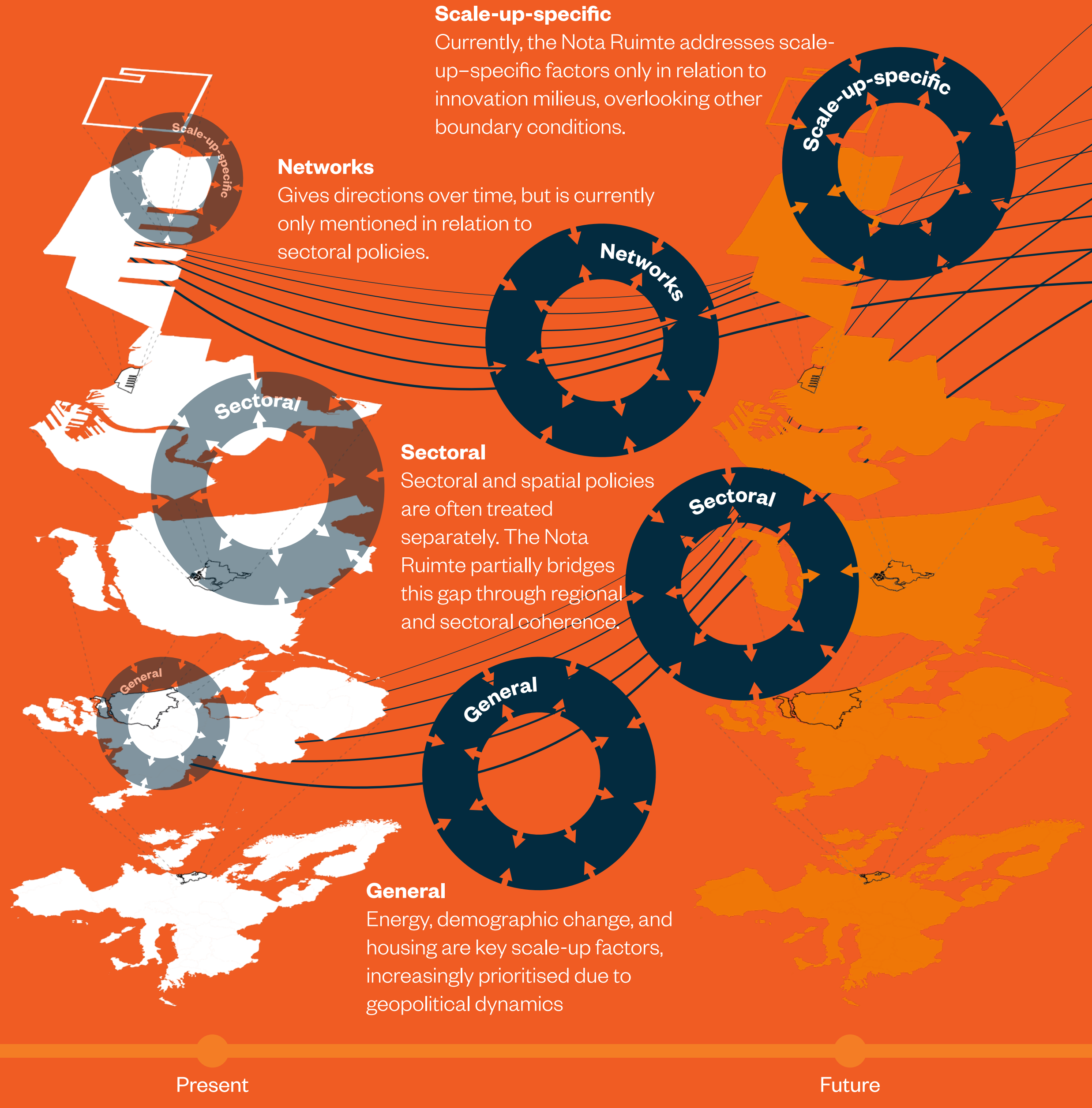
The local scale appears in the Nota Ruimte mainly as the area of implementation, where municipalities and provinces manage zoning, environmental constraints and site-specific trade-offs. Within the framework, this level is dominated by scale-up-specific boundary conditions. Local characteristics determine whether a location is feasible at all, rather than influencing the direction of spatial development. This explains why some locations remain structurally excluded from scale-up activity, despite alignment with national or regional policy ambitions.

Through this approach, the framework is used not only as a descriptive tool but also as an analytical instrument. It enables the identification of mismatches between policy intentions and the actual spatial dynamics of scale-ups, and it provides an initial form of action-oriented insight by clarifying what happens where, when, and at which scale.

Policy and framework

Illustrated by Ontwerp Nota Ruimte

The figure illustrates how the framework captures spatial dynamics across time and scale. It shows how the Ontwerp Nota Ruimte operates at different spatial levels. The diagram visualises the relative importance assigned to each component, emphasising that spatial dynamics are not static but evolve over time. In addition, the figure indicates that current policy, represented transparently, does not yet address all components to the same extent. Although the different factors are shown separately, they strongly reinforce one another and interact continuously. This highlights both the complexity of spatial dynamics and the challenges involved in translating this complexity into coherent policy.



6 Discussion and conclusion

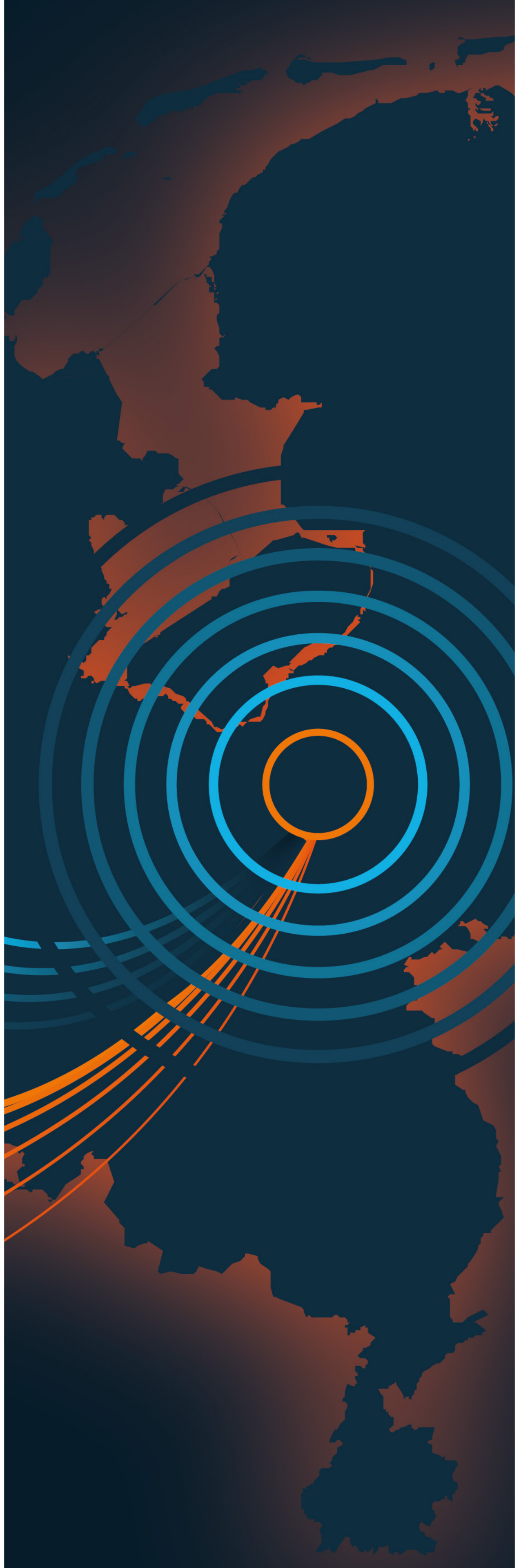
6.1 Discussion

The empirical results demonstrate that the geographical distribution of scale-ups in the Netherlands is shaped by a complex and dynamic interplay of spatial, sectoral and socio-economic factors. Rather than reflecting a purely path-dependent pattern or a dominant agglomeration logic, scale-up geography emerges from overlapping forces of spatial shifting and spatial anchoring that operate simultaneously. Over time, scale-ups do not remain fixed in one location but display gradual spatial redistribution, while specific sectors remain tied to particular regions due to their physical, labour-related or infrastructural requirements. As a result, the observed spatial pattern appears partly unpredictable from a regional planning perspective and challenges assumptions of stable and persistent scale-up hotspots.

A key finding is the gradual eastward shift of scale-up hotspots and the relative weakening of the exclusive dominance of the Randstad. This suggests that the geography of scale-ups is more fluid than often assumed in debates on regional innovation systems and economic agglomeration. While the Randstad remains an important centre, it no longer functions as the sole or inevitable locus of scale-up activity. This finding contrasts with strands of literature that emphasise long-term path dependence and cumulative advantage in innovative regions (Balland et al., 2020; Boschma et al., 2010; Cséfalvay, 2024). Instead, the Dutch case illustrates that opportunities for scaling increasingly emerge outside established cores, indicating a more adaptive and spatially distributed growth dynamic. One possible explanation relates to the spatial concentration of large firms. In regions dominated by major corporations, these firms may absorb a substantial share of the available workforce, thereby constraining the labour pool accessible to scale-ups. As a result, scale-ups may be more likely to emerge in regions where competition for skilled labour is less intense. This suggests that, in regions dominated by large firms, key boundary conditions for scale-up growth may be less favourable.

At the same time, the results clearly show that scale-ups are not evenly distributed across the country. Certain locations continue to anchor scale-ups because they combine physical, social and economic conditions that are particularly conducive to scaling. This anchoring effect is visible in the persistence of specific regional and sectoral profiles, as well as in the observed relationship between urban environments and the presence of scale-ups. These findings align with the literature on regional branching and path dependence (Boschma & Frenken, 2009; Boschma et al., 2010), which emphasises the role of related capabilities and local structures in shaping regional development trajectories.

In this context, the role of regional networks also emerges as an important factor, particularly for policy development. The empirical results demonstrate how the share of scale-ups within specific sectoral specialisations can be analysed using the enrichment ratio. Although this ratio isn't completly finalised, it offers a valuable analytical tool for regions seeking to define strategic priorities and, at the national level, to provide direction for spatial-economic



policy. It helps reveal relative strengths and emerging specialisations, rather than assuming a uniform national scale-up landscape.

Boundary conditions for scale-ups emerge as the final factor that is key in analysing geographical distribution. At the municipal scale, the empirical results show strong associations between scale-up locations and socio-demographic characteristics, particularly the presence of a young and highly educated workforce (Leendertse et al., 2022; Peirone et al., 2024; Pinheiro et al., 2022). Despite their indirect nature, these conditions appear central to scaling processes, yet they remain underemphasised, partly due to limited research. This disconnect suggests that spatial and economic policies may overlook key enabling conditions by focusing primarily on direct financial support rather than broader socio-spatial environments.

The empirical findings confirm strong connections with existing literature, while also revealing the inherently dynamic nature of scale-ups. Due to the uncertainty and volatility associated with rapid growth, scale-ups appear to be more spatially fluid than many theoretical frameworks suggest. Much of the existing literature focuses on ecosystems as a whole (TNO, 2023; Stam, 2016), with scale-ups treated as one component within these systems. While this literature provides a solid foundation for understanding broader economic concepts, it pays relatively limited attention to the specific question of what scale-ups need, and how these needs differ from other firm typologies. This study contributes to that gap by explicitly examining how established theoretical insights apply differently to scale-ups, and by mapping the distinctive spatial patterns associated with their growth trajectories.

The results therefore suggest that scale-up policy and spatial policy are inherently interdependent. Shifting and anchoring processes are simultaneously shaped by land-use pressures, regional structures and sectoral requirements, alongside firm-level spatial and socio-economic boundary conditions. Policies aimed at supporting scale-ups cannot be designed independently from spatial planning considerations. Conversely, spatial strategies that fail to account for the specific conditions required for scaling risk misinterpreting where future economic activity is likely to materialise.

6.1.1 Scope and limitations

To assess the extent to which the results can be generalised, it is essential to consider the scope of the study as well as the contextual and methodological factors that shape the interpretation of the findings. The empirical analysis covers a ten-year period in the Netherlands, which strengthens the identification of longer-term trends. However, this period also includes the COVID-19 pandemic, which had a significant negative impact on many firms. For scale-ups in particular, the dependence on external capital made them especially vulnerable during this period, which is reflected in declining scale-up numbers in the later years of the dataset. Furthermore, the scope of the study is limited by data availability, with much of the analysis conducted at the municipal level. As a result, the findings should be interpreted at that scale and caution is required when generalising beyond it. Finally, the analysis is based on correlations rather than causal testing, meaning that the observed relationships should be understood as indicative patterns rather than definitive causal mechanisms.

Next to the context there are some methodological limitations. A first and fundamental limitation concerns the operationalisation of scale-ups. Due to the absence of financial data, scale-ups in this study are identified solely on the basis of employment growth. While this approach captures where firms expand their workforce, it does not reflect growth in terms of turnover, productivity or innovation output. As a result, the analysis primarily maps the geography of scaling capacity rather than the geography of innovation or economic performance. This implies that labour-intensive sectors are more likely to be represented, whereas capital-intensive, knowledge-intensive or highly automated firms may be underrepresented. Consequently, the findings are not directly comparable to studies that apply broader or multi-dimensional definitions of scale-ups, and conclusions cannot be generalised to all forms of high-growth entrepreneurship.

A second data-related limitation arises from the structure of the LISA dataset, which identifies firms on the basis of establishment numbers rather than firm-level continuity. When a company relocates over a long distance or opens an additional establishment, a new identifier is assigned. This complicates the tracking of firm trajectories over time and may lead to the fragmentation of growth paths across multiple records. To mitigate this issue, LISA establishment numbers were combined with Chamber of Commerce (KvK) identifiers, and additional filters were applied to avoid the overrepresentation of organisational restructuring processes, such as mergers in sectors like healthcare. While these steps improved the identification of scale-ups, they cannot fully eliminate inconsistencies in firm-level tracking.

Relatedly, the dataset records only the registered main location of firms and does not capture multi-site structures, distributed teams or virtual forms of organisation. Many scale-ups operate across multiple locations or combine physical and digital modes of work, yet only a single address is reflected in the data. This simplification may distort spatial patterns, particularly in sectors where production, research and management are spatially separated. The spatial outcomes presented in this thesis should therefore be interpreted as headquarter geographies rather than comprehensive representations of operational or network geographies.

A further limitation concerns the primarily quantitative and correlational nature of the research design. Although the longitudinal dataset provides strong descriptive insights into spatial patterns and dynamics over time, it does not allow for causal interpretation regarding why scale-ups locate or relocate to specific places. Observed patterns may reflect underlying institutional, cultural or governance-related mechanisms that are not captured in the available data. Only four interviews were conducted, and these served illustrative rather than explanatory purposes. As a result, qualitative mechanisms such as local entrepreneurial culture, institutional quality or the role of intermediaries remain largely unobserved. The interpretations offered in this thesis should therefore be understood as plausible explanations grounded in spatial logic, rather than as empirically confirmed causal mechanisms.

The size and distribution of the scale-up population further constrain the analysis. Approximately 2,800 scale-ups are identified per year, but these are unevenly distributed across regions and sectors. This limits the longitudinal robustness of firm-level and sectoral comparisons and reduces the ability to trace individual growth trajectories over time. Consequently, more granular findings, particularly those based on enrichment ratios or specific sector–region combinations, should be interpreted with caution.

Finally, the retroductive research approach adopted in this study introduces an inherent interpretative bias. Retroduction assumes that observed patterns are the outcome of underlying mechanisms that cannot be fully observed, which means that analysis is inevitably influenced by the researcher's theoretical lens and worldview. Efforts were made to mitigate this bias through critical reflection and engagement with professionals, incorporating alternative perspectives where possible. This stance is consistent with the critical realist approach outlined in the methodology, which acknowledges that socio-economic systems are complex, interdependent and only partially observable. As a result, this thesis does not claim to provide a complete or definitive explanation of scale-up geography, but rather an informed and theoretically grounded interpretation of a complex spatial phenomenon.

6.1.2 Contributions

This study contributes to the academic debate by demonstrating that the spatial mechanisms shaping scale-up geography are inherently economic and spatial at the same time. At the same time this research gives a visual description of this phenomenon. Scale-ups cannot be understood without accounting for the spatial structures, regional contexts and physical environments in which they operate. The findings show that sector-specific mechanisms mediate how spatial assets, such as human capital, infrastructure and land, become productive for growth. This extends relational and evolutionary perspectives by emphasising that space is not merely a backdrop but an active dimension of firm development. Scale-up geography therefore emerges from shifting and anchoring processes that co-evolve across multiple spatial scales.

At the meso level, the results reveal a fundamental paradox for regional policy, scale-up development is partly self-organising and follows spatial logics that cannot be fully engineered. Attempts to steer growth may therefore be ineffective or risk constraining the dynamics that enable firms to scale. Yet regions are not powerless. The empirical analysis shows that a COROP area can see scale-up development and act on it. Regions with strong sectoral specialisation can focus on monitoring, stable but neutral regions require selective support from government bodies to attract. Lastly, highly volatile regions benefit if they steer into a different direction, if they want to act. Effective policy therefore depends on recognising and responding to region-specific spatial dynamics.

At the micro level, the findings translate into concrete implications for ROMs and local governments. Supporting scale-ups requires more than allocating business space, the surrounding environment must also fit the demographic, spatial and infrastructural needs of scale-ups. This includes providing suitable premises (often 800–1200 m²), facilitating appropriate environmental categories for businesses, ensuring accessible mobility networks and maintaining housing options that match the young, highly skilled labour pool scale-ups rely on.

6.1.3 Recommendations

Despite its exploratory nature and methodological limitations, this thesis offers several insights that can inform both policy practice and future research. Rather than providing prescriptive solutions, the recommendations presented in Table 11 should be read as cautious guidance for national and regional authorities, alongside a forward-looking research agenda aimed at strengthening understanding of scale-up spatial dynamics in the Netherlands.

From a policy perspective, the findings indicate that spatial conditions are most effective when they align with the growth phase and organisational needs of scale-ups. The observed demand for flexible medium-scale premises (approximately 800–1200 m²) points to a typological gap in many regional real estate markets. While this range should not be interpreted rigidly, it highlights the importance of maintaining adaptable building typologies that allow firms to scale without immediate relocation. In this context, brownfield redevelopment emerges as a particularly relevant strategy, as such locations often combine accessibility, adaptability and identity in ways that align with scale-up environments. Rather than focusing solely on land scarcity, regional authorities could play a more active role in steering scale-ups towards locations where spatial constraints can be mitigated through targeted redevelopment.

In addition, the results underline the importance of aligning economic development strategies with housing policy. The strong association between scale-up locations and the presence of a young, highly educated workforce suggests that housing availability functions

Table 11: Recommendations (for future research) (own table)

	Recommendation
Practical recommendations (policy)	Provide flexible medium-scale premises (800–1200 m² typologies)
	Prioritise brownfield redevelopment aligned with scale-up environments
	Align housing supply with young, highly skilled labour demand
	Apply monitor, attract, steer (MAS) as a flexible regional policy approach
	Take the policy paradox into account
Recommendations for future research	Integrate financial performance data into scale-up definitions
	Test causal relationships using econometric methods and model housing and demographic factors as explanatory variables
	Apply mixed-methods designs (quantitative + qualitative cases)
	Conduct comparative regional and international policy analysis

as a supporting condition for regional scale-up dynamics. Although housing policy alone cannot generate scale-up growth, mismatches between housing supply and workforce demand may undermine regional attractiveness. This points to the need for closer coordination between spatial planning, housing provision and economic policy at the regional level.

Finally, the findings support a differentiated governance approach, conceptualised here as a Monitor–Attract–Steer framework. Given the diversity of regional scale-up dynamics, policy interventions are likely to be most effective when they are tailored to regional maturity and capacity. Monitoring enables the identification of emerging ecosystems, attraction strategies can reinforce existing concentrations, and steering mechanisms may be appropriate where growth pressures or spatial mismatches arise. Importantly, this framework acknowledges the policy paradox identified in this thesis: while scale-up development follows spatial logics that cannot be fully engineered, informed and flexible intervention can still shape enabling conditions.

6.1.4 Future research

Several directions for future research emerge from this study. A first priority lies in refining how scale-ups are measured. Moving beyond employment-based definitions by integrating financial performance indicators, such as turnover growth, investment volumes or capital intensity, would allow future research to distinguish between labour-driven and capital-driven scaling processes. This would enable more precise testing of whether spatial shifting and anchoring mechanisms differ across growth profiles.

Second, future research would benefit from explicitly mixed-methods designs. While quantitative spatial analysis reveals broad patterns, combining econometric modelling with qualitative case studies would strengthen causal interpretation and provide deeper insight into firm-level decision-making. In particular, modelling housing and demographic variables as explanatory factors using panel data or multivariate techniques could clarify how residential geographies interact with scale-up development. Comparative regional and international analyses would further enhance understanding of how different governance approaches shape spatial outcomes for scale-ups over time.

Together, these recommendations and research directions position this thesis as a starting point rather than an endpoint. By combining cautious practical guidance with a clear methodological agenda, future work can build towards a more robust understanding of the spatial mechanisms underpinning scale-up dynamics in the Netherlands.

6.2 Conclusion

This thesis examined the geographical distribution of scale-ups in the Netherlands to understand how spatial, sectoral and socio-economic factors shape their development over time. The findings show that scale-up geography cannot be explained through a single dominant logic, but instead emerges from a dynamic interplay between spatial shifting and spatial anchoring.

The empirical findings show that scale-ups do not remain fixed in one location but gradually redistribute across space. The observed eastward shift of scale-up activity and the weakening of the Randstad's exclusive dominance indicate that opportunities for scaling increasingly emerge beyond traditional economic cores. Although the Randstad remains important, it no longer functions as the singular location of scale-up development.

At the same time, scale-ups are not evenly dispersed across the country. Certain regions continue to function as anchors due to their physical, social and economic conditions.

Persistent regional and sectoral profiles underline the importance of local capabilities, indicating that scale-up geography is shaped by the interaction between spatial mobility and place-based embeddedness.

Beyond regional patterns, the findings highlight the importance of sectoral composition and regional networks. Scale-up dynamics differ substantially across sectors and regions, reinforcing the need for context-sensitive interpretation.

A further key insight concerns socio-demographic boundary conditions. At the municipal level, scale-up locations are strongly associated with a young and highly educated workforce. This points to a mismatch between empirical realities and policy frameworks that prioritise direct firm-level support while underestimating broader socio-spatial conditions for growth.

Taken together, the results demonstrate that scale-up policy and spatial policy are fundamentally interdependent. Policies aimed at supporting scale-ups cannot be designed independently from spatial planning, while spatial strategies that ignore scale-up conditions risk misinterpreting future economic activity.

This thesis contributes to academic and policy debates by demonstrating that scale-up geography is shaped by economic and spatial mechanisms simultaneously. Space functions not merely as a backdrop, but as an active dimension of firm development. At the policy level, the findings reveal a fundamental paradox. Scale-up development is partly self-organising and cannot be fully engineered, yet regions are not powerless. Distinct regional patterns indicate that effective policy requires differentiated and context-sensitive responses. The findings underline the importance of recognising the complexity of the scale-up landscape in policy design. Scale-up dynamics do not follow a uniform trajectory and require differentiated, spatially informed policy approaches that align analytical insight with practical intervention.

In conclusion, this thesis shows that the the geography of Dutch scale-ups is shaped by an interplay of spatial dynamics yet remains inherently organic, reflecting both the shifting demands of scale ups and the anchoring effect of sectoral and regional environments. Understanding this dual logic strengthens our insight into how economic growth and spatial development interact. The ultimate goal is to see policy makers adapt this framework and add to the competitiveness of Europe though scale-ups and there innovations.

“Start-ups and scale-ups are the engine for economic growth and for solutions that make our society stronger and more sustainable. If we want the Netherlands to be able to continue to pay for our healthcare, education and security in 10 years’ time, we desperately need this new generation of companies.”

V. Karremans, 2025
Minister of Economic Affairs and Climate Policy
Translated quote

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Appendix: Top sectors

Top sector	Subsector	SBI 2008 description (EN)	SBI 2008
Agri & Food	Primary production	Growing of cereals (except rice), leguminous crops and oil seeds	0111
		Growing of vegetables and melons, roots and tubers	0113
		Raising of animals	0140
		Mixed farming (crop and animal production)	0150
		Support activities for crop production	0161
		Support activities for animal production	0162
		Post-harvest crop activities	0163
		Hunting, trapping and related service activities	0170
		Fishing and aquaculture	03
	Food industry	Manufacture of food products	10
		Manufacture of beverages	11
	Wholesale & retail	Agents specialised in the sale of agricultural raw materials, live animals, textile raw materials and semi-finished goods	4611
		Wholesale of grain, unmanufactured tobacco, seeds and animal feeds (excl. raw tobacco)	4621 (excl. 46217)
		Wholesale of live animals	4623
		Wholesale of hides, skins and leather	4624
		Wholesale of food, beverages and tobacco (excl. tobacco products)	463 (excl. 4635)
		Wholesale of agricultural machinery, equipment and supplies	4661
		Wholesale of machinery for the food, beverage and tobacco industry	46682
		Retail sale in non-specialised stores with food, beverages or tobacco predominating (supermarkets etc.)	4711
		Retail sale of food, beverages and tobacco in specialised stores (excl. tobacco)	472 (excl. 4726)
		Retail sale via stalls and markets of food, beverages and tobacco products	4781
	Food services	Food and beverage service activities	56
	Other	Manufacture of fertilisers and nitrogen compounds	2015
		Manufacture of pesticides and other agrochemical products	2020
		Manufacture of agricultural and forestry machinery	2830
		Manufacture of machinery for food, beverage and tobacco processing	2893
		Research and experimental development on biotechnology (agricultural products and processes)	72111
		Research and experimental development on natural sciences and engineering (agriculture & fisheries, non-biotech)	72191

Topsector	Subsector	SBI 2008 description (EN)	SBI 2008
Chemicals	Petroleum refining	Manufacture of coke and refined petroleum products	19
	Chemical industry	Manufacture of chemicals and chemical products	20
	Rubber and plastics industry	Manufacture of rubber and plastic products	22

Topsector	Subsector	SBI 2008 description (EN)	SBI 2008
Creative Industries	Arts	Performing arts	90011
		Support activities for performing arts	90012
		Artistic creation	9003
		Support activities for artistic creation	9002
	Cultural heritage	Other cultural education and lending of works of art, archives	91019
		Museums activities	91021
		Operation of historical sites and buildings and similar visitor attractions (heritage conservation)	9103
	Media & entertainment	Publishing activities	58
		Motion picture, video and television programme production, sound recording and music publishing activities	59
		Photographic activities	74201
		Music and video publishing (digital content, online, games, interactive media)	—
		Computer games publishing / gaming industry	—
	Creative business services	Public relations and communication activities	7021
		Architectural activities	7111
		Advertising agencies	7311
		Specialised design activities (industrial, product, fashion, graphic design)	7410
		Digital agencies (web design, digital marketing etc.)	—

Topsector	Subsector	SBI 2008 description (EN)	SBI 2008
Energy	Natural gas	Extraction of natural gas	0620

		Manufacture of gas	352
		Support activities for petroleum and natural gas extraction	0910
	Power generation	Production of electricity (thermal, nuclear and combined heat-power plants)	35111
	Renewable energy	Non-exploitation phase (preparatory activities for renewables)	—
	Related activities	Transmission of electricity	3512
		Distribution of electricity, gas, steam and air conditioning supply	3513
		Trade of electricity and gas through pipelines	3514
		Steam and air conditioning supply	3530
		Manufacture of batteries and accumulators	272
	R&D	Research and experimental development on biotechnology (energy applications)	72113
		Research and experimental development on natural sciences and engineering (energy)	72192
		Other research and experimental development on natural sciences and engineering	72199

Topsector	**Subsector**	**SBI 2008 description (EN)**	**SBI 2008**
Hightech	Metal industry	Manufacture of basic metals	24
		Manufacture of tanks, reservoirs and containers of metal; manufacture of central heating radiators and boilers	252
		Manufacture of steam generators, except central heating hot water boilers	253
		Manufacture of weapons and ammunition	254
		Forging, pressing, stamping and roll-forming of metal; powder metallurgy	255
		Treatment and coating of metals; general mechanical engineering	256
		Manufacture of tools	2573
		Manufacture of steel drums and similar containers	2591
		Manufacture of wire products, chain and springs	2593
		Manufacture of fasteners and screw machine products	2594
		Manufacture of other fabricated metal products n.e.c.	2599
		Repair of fabricated metal products	3311
	Machinery & equipment	Manufacture of computers and electronic and optical products	26
		Manufacture of electrical equipment	27
		Manufacture of machinery and equipment n.e.c.	28
		Manufacture of medical and dental instruments and supplies	3250
		Repair of machinery	3312
		Repair of electronic and optical equipment	3313
		Repair of electrical equipment	3314
		Repair of other equipment	3319
		Installation of industrial machinery and equipment	332
	Transport equipment	Manufacture of rubber tyres and retreading	2211
		Manufacture of other plastic products	2229
		Manufacture of motor vehicles	2910
		Manufacture of bodies (coachwork) for motor vehicles; manufacture of trailers and semi-trailers	29201
		Manufacture of electrical and electronic equipment for motor vehicles	2931
		Manufacture of other parts and accessories for motor vehicles	2932
		Manufacture of railway locomotives and rolling stock	3020
		Manufacture of air and spacecraft and related machinery	3030
		Manufacture of military fighting vehicles	3040
		Manufacture of transport equipment n.e.c.	309
		Repair and maintenance of aircraft and spacecraft	3316
		Repair and maintenance of other transport equipment	3317
	Other	Computer programming, consultancy and related activities (software development & publishing)	6201
		Research and experimental development on natural sciences and engineering (technical R&D)	72192
		Engineering activities and related technical consultancy	7112
		Technical testing and analysis (inspection of machinery, equipment and materials)	71202

Topsector	**Subsector**	**SBI 2008 description (EN)**	**SBI 2008**
Life Sciences & Health	Pharmaceuticals	Manufacture of basic pharmaceutical products and pharmaceutical preparations	21
	Medical instruments	Manufacture of irradiation, electromedical and electrotherapeutic equipment	2660
		Manufacture of medical and dental instruments and supplies	3250
	Research	Research and experimental development on biotechnology (medical products, pharmaceuticals, food)	72112
		Research and experimental development on natural sciences and engineering (health, non-biotech)	72193

Topsector	**Subsector**	**SBI 2008 description (EN)**	**SBI 2008**

Logistics	Transport & transshipment	Passenger rail transport, interurban	4910
		Freight rail transport	4920
		Freight transport by road	494
		Transport via pipelines	4950
		Sea and coastal freight water transport	5020
		Inland freight water transport	5040
		Freight air transport and space transport	512
		Postal and courier activities	53
	Storage, services & support	Warehousing and storage	521
		Service activities incidental to land, water and air transportation	522
		ICT, consultancy and research	—

Topsector	**Subsector**	**SBI 2008 description (EN)**	**SBI 2008**
Horticulture	Primary production	Growing of cereals, legumes and oil seeds - starting materials (Plantum members)	0111
		Growing of vegetables and melons, roots and tubers	0113
		Growing of non-perennial crops	0119
		Growing of grapes	0121
		Growing of pome fruits and stone fruits	0124
		Growing of other tree and bush fruits and nuts	0125
		Growing of spices, aromatic, drug and pharmaceutical crops	0128
		Growing of other perennial crops	0129
		Growing of ornamental plants	0130
		Mixed farming (crop and animal production) - starting materials (Plantum members)	0150
	Other	Support activities for crop production - starting materials (Plantum members)	0161
		Post-harvest crop activities - starting materials (Plantum members)	0163
		Seed processing for propagation	0164
		Starting materials sector companies (breeding, propagation, nursery, equipment, trade – Plantum members)	—
		Wholesale of seeds, planting stock and legumes	46212
		Wholesale of agricultural raw materials and animal feeds (general assortment) - greenhouse horticulture, starting materials (Plantum/AVAG members)	46218
		Wholesale of other agricultural raw materials - starting materials (Plantum members)	46219
		Wholesale of flowers and plants	4622
		Wholesale of fruit and vegetables	46311
		Greenhouse horticulture suppliers (greenhouse construction, installation, machinery, equipment, trade – AVAG members)	—
		Auctioning of agricultural products (horticulture auctions)	82991
	R&D	Research and experimental development on biotechnology (agriculture and processes)	72111
		Research and experimental development on biotechnology (other applications)	72113
		Research and experimental development on natural sciences and engineering (agriculture and fisheries, non-biotech)	72191
		Research and experimental development on natural sciences and engineering (technical)	72192
		Other research and experimental development on natural sciences and engineering	72199

	Subsector	**SBI 2008 description (EN)**	**SBI 2008**
Water & Maritime	Maritime manufacturing	Building of ships and floating structures	3011
		Building of pleasure and sporting boats	3012
		Repair and maintenance of ships and boats	3315
		Support activities for petroleum and natural gas extraction - Offshore industry	0910
		Suppliers to the maritime sector	—
	Water technology, supply & waste water treatment	Water collection, treatment and supply	3600
		Sewerage (only private sector)	3700
		Treatment and disposal of non-hazardous waste	3821
		Manufacture of equipment/apparatus	—
	Delta technology	Construction of water projects (sewer systems, pipelines, dewatering)	4221
		Construction of water projects (dredging and hydraulic works)	4291
		Construction of civil engineering works (bridges, locks, flood works)	4213
	Knowledge & consultancy	Research and experimental development on biotechnology (knowledge institutions)	72113
		Research and experimental development on natural sciences and engineering (technical)	72192
		Other research and experimental development on natural sciences and engineering	72199
		Engineering activities and related technical consultancy	7112

Appendix: Variables

Variable	Description	Measure.	Scale	Composed
Age	Number of inhabitants per age category between 18 - 65 (working age), divided into two groups <45 years and >45 years	Ordinal	Municipaity	Not
Businesses	Total number of businesses.	Scale	Municipaity	Not
Businesses per sector	Total number of businesses per sector based on SBI 2008, divided into seven categories: agriculture, forestry and fishing; industry and energy; construction; trade and hospitality; transport and communication; financial and business services; and public services.	Scale	Municipaity	Not
CBS sectors	Sector classification based on SBI 2008 according to the Key Figures for Districts and Neighbourhoods (Kerncijfers Wijken en Buurten).	Nominal	Scale-up	Not
Clustering LQ	The LQ indicates whether sector k is over- or underrepresented in region r. With LQ < 1 is underrepresented, = 1 is normal and > 1 is overrepresented	Scale	Large company	Composed
Distance to business park	Distance in metres to the nearest business park (as-the-crow-flies). A value of 0 indicates that the business is located within a business park.	Scale	Scale-up	Composed
Distance to education	Distance in metres to the nearest university or university of applied sciences (as-the-crow-flies).	Scale	Scale-up	Composed
Distance to motorway	Distance in metres to the nearest motorway (as-the-crow-flies).	Scale	Scale-up	Composed
Distance to public transport	Distance in metres to the nearest NS railway station (as-the-crow-flies).	Scale	Scale-up	Composed
Education level	Number of inhabitants who have attained a given educational level, divided into three categories: low, medium, and high.	Ordinal	Municipaity	Not
Enrichment ratio	An enrichment ratio greater than 1 indicates that scale-ups are overrepresented in the regional specialisations, meaning they tend to reinforce and align with existing clusters.	Scale	All scales	Composed
Floor area	BAG floor space based on the data from LISA	Scale	Scale-up	Not
Growth factor	Indicates whether the net migration is positive or negative.	Scale	Municipaity	Not
Population density	Number of inhabitants per square kilometre.	Scale	Municipaity	Not
Relatedness	Value how closely two SBI2008 sectors are connected economically. Higher values means more related, but exact numbers depend on the scale used and are not directly comparable across different scales.	Scale	Municipaity	Composed
Relocation distance	Distance between old and new location in meters	Scale	Scale-up	Composed
Topsectors	Distribution across the ten top sectors defined by the (Rijksdienst voor Ondernemend Nederland, 2025). Specific SBI 2008 codes per sector are provided in Appendix X. A business may belong to multiple sectors.	Nominal	Scale-up	Composed
Type of education	Indicates whether the nearest educational institution is a university (WO) or a university of applied sciences (HBO).	Nominal	Scale-up	Composed
Unrelatedness	Value how different two SBI2008 sectors are economically. Higher values indicate less similarity or connection between sectors, but exact numbers depend on the scale used and are not directly comparable across different scales.	Scale	Municipaity	Composed
Urban density	Categorised according to address density (addresses per km²): (1) very highly urbanised ≥ 2,500; (2) highly urbanised 1,500–2,500; (3) moderately urbanised 1,000–1,500; (4) low urbanisation 500–1,000; (5) non-urbanised < 500.	Ordinal	Municipaity	Not

Table 12: Descriptives and frequencies of variables per municipality (n=345) (own table)

	Min	Max	Mean	Std.Dev.	Median
Age					
< 45 years	35	71	49,37	5	49
> 45 years	29	64	50,65	4,98	51
Education level					
Low	140	159020	10241	15205	6550
Medium	330	216730	16207	20466	10500
High	280	349370	12453	25517	6960
Population density	22	6172	900	1064	476
Unrelatedness	2,94	3,67	3,40	0,12	3,41
Relatedness	0,62	1,58	1,28	0,15	1,30
H total	3,64	5,11	4,68	0,23	4,73

	Number	Percentage
Urbanisation		
1 very high	23	6,7%
2 high	72	20,9%
3 moderatly	77	22,3%
4 low	124	35,9%
5 very low	49	14,2%
Totaal	345	100,0%

Table 13: Overview of total numbers of businesses and scale ups (own table)

	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	Total unique (n)
Companies (>2 pers)	**534752**	**527757**	**525597**	**525521**	**526964**	**527983**	**533369**	**537250**	**544124**	**549400**	**961352**
CBS sector											
Agriculture, forestry and fishing	46503	44717	43966	43551	42824	42493	42023	41032	39608	38766	61379
Manufacturing and energy	66928	65228	64805	64171	63949	63449	63536	63790	63952	65147	106838
Trade and hospitality	176967	174657	173794	173623	173084	174560	175893	175623	180006	181402	320432
Transport, information and communication	35079	34903	35321	35802	36117	36398	36629	36842	37275	37934	72588
Financial services and real estate	17185	16746	16445	16417	16463	16282	16285	16060	16021	16203	28821
Business services	81233	79844	79413	80118	80979	80680	82162	82727	82776	83616	163535
Culture, recreation and other services	36388	36476	35810	35459	35505	34728	34930	35420	35940	35714	66804
Other / Unknown	74469	75186	76043	76380	78043	79393	81911	85756	88546	90618	140955
Topsectors											
Agri&Food	75491	74694	74638	75374	75543	76156	76852	76544	76122	76218	127433
Chemistry	1787	1736	1726	1722	1740	1739	1702	1687	1686	1709	2411
Creative Industries	21122	21134	20907	20994	21154	21067	21344	21767	22583	22766	48347
Energy	963	969	996	1022	1050	1062	1098	1107	1147	1180	1978
HighTech	27777	27610	27583	27960	28085	28039	28258	28540	28643	28925	50671
Horticulture	24197	23373	22943	22776	22356	22121	21942	21529	20910	20613	33962
ICT	17880	18030	18439	18997	19108	19261	19425	19661	19942	20267	40393
Life Sciences & Health	1788	1791	1785	1793	1839	1837	1870	1857	1895	1897	2956
Logistics	13978	13702	13564	13452	13620	13606	13674	13692	13953	14285	24102
Water & Maritime	11098	10930	10676	10638	10603	10472	10650	10661	10719	10887	19356
None	373345	367763	365830	364569	365420	366022	370227	373924	380192	384401	670084
Scale-ups	**2339**	**2651**	**2681**	**2795**	**3277**	**3556**	**3546**	**2923**	**2564**	**2484**	**15777**
CBS sector											
Agriculture, forestry and fishing	15	105	105	109	124	119	117	124	98	75	545
Manufacturing and energy	557	563	564	647	778	937	903	697	547	503	3695
Trade and hospitality	576	642	642	659	768	787	805	674	613	597	3748
Transport, information and communication	386	439	434	429	511	549	509	415	396	399	2329
Financial services and real estate	71	85	90	86	103	113	107	86	75	74	470
Business services	494	575	598	595	715	750	794	656	567	588	3438
Culture, recreation and other services	88	92	91	103	114	122	105	88	79	79	567
Other / Unknown	152	150	157	167	164	179	206	183	189	169	985
Topsectors											
Agri&Food	210	292	301	312	315	315	337	257	222	211	1480
Chemistry	33	37	36	41	41	46	42	43	31	19	189
Creative Industries	41	74	83	73	104	106	107	71	73	77	464
Energy	31	31	34	26	27	30	26	28	19	24	144
HighTech	299	318	314	326	380	455	477	401	327	311	1934
Horticulture	64	153	165	156	176	164	166	161	132	119	791
ICT	216	246	246	246	295	332	316	271	233	229	1352
Life Sciences & Health	24	24	25	33	33	31	28	29	20	31	135
Logistics	160	191	185	184	211	221	206	165	173	176	972
Water & Maritime	112	105	120	138	161	152	170	142	114	133	732
None	1402	1493	1508	1592	1905	2111	2092	1733	1517	1451	9367

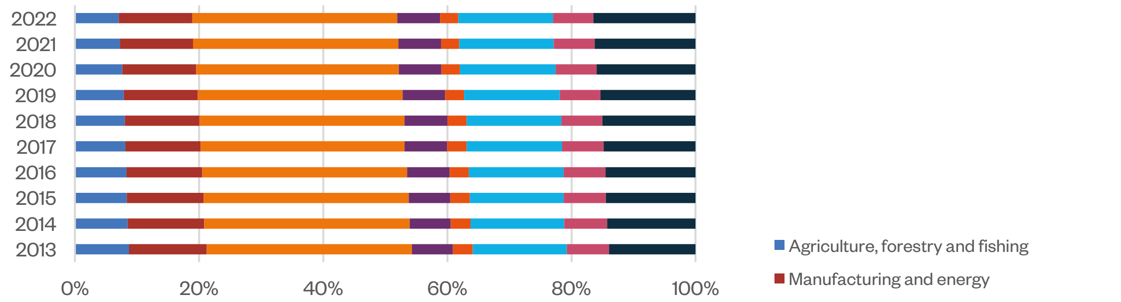

Figure 24: Distribution of companies over 10 year period per CBS sector (own image)

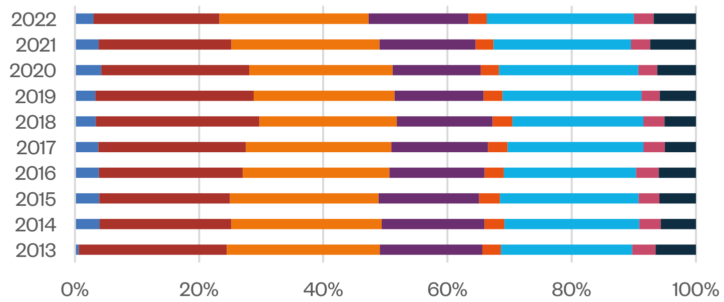

Figure 25: Distribution of scale ups over 10 year period per CBS sector (own image)

Table 14: Descriptives and frequenties of scale-ups specifically (n=15777) (own table)

	Min	Max	Mean	Std.Dev.	Median	Number
Distance to business park	0,00	8365,50	417,33	744,64	0,00	28497
Distance to education	0,00	72392,93	12500,50	11355,90	9296,42	28497
Distance to public transport	28,76	34792,61	3614,16	4080,86	2154,74	28497
Floor area	0,00	90464,00	3297,00	7073,00	1120,00	28497
CAGR	0,20	5,43	0,32	0,19	0,27	28497
Relocation distance 5 year span						
2013	0,05	44718,25	3332,53	5613,25	1094,91	1088
2014	0,01	42963,72	3645,15	5658,81	1267,05	1094
2015	0,05	58836,87	3933,76	6460,48	1368,67	1115
2016	0,01	64230,01	3758,25	6020,89	1612,12	1254
2017	0,01	57141,02	3564,08	5560,58	1532,70	1430
2018	0,13	57141,02	3448,44	5262,21	1498,36	835
2019	2,14	57141,02	3909,96	6034,93	1704,96	851
2020	2,14	58773,57	3520,98	5236,77	1523,06	758
2021	0,01	58773,57	3809,95	5675,58	1701,30	640
2022	0,01	53480,44	4342,22	6783,22	1718,74	607

Distance to business parks	**Number**	**Percentage**
Business parks	16048	56%
<500 m	4450	16%
500-1 km	3526	12%
1+ km	4473	16%
	28497	100%

Appendix: DMPonline

A Data Management Plan created using DMPonline

Title: A spatial analysis of scale ups in the Netherlands

Creator: Peter Baarda

Principal Investigator: Peter Baarda

Affiliation: Delft University of Technology

Template: TU Delft Data Management Plan template (2025)

Project abstract:

Europe seeks to reinforce its economic resilience and strategic autonomy through innovation. Scale-ups, as rapidly growing firms advancing beyond the start-up stage, play a pivotal role in driving innovation, creating jobs, and spreading new technologies. Yet, little explicit research has been conducted on what specific spatial conditions scale-ups need to thrive, resulting in Dutch spatial planning policies that are insufficiently aligned with their growth dynamics. This thesis investigates how spatial planning in the Netherlands can better support the development of scale-ups. Using a mixed-methods approach, it combines a GIS-based spatial analysis of the location patterns and typologies of Dutch scale-ups with scenario development and stakeholder interviews to explore future-oriented planning strategies. The research aims to fill the current knowledge gap on the spatial claims of scale-ups and proposes planning instruments that can enable their growth. By clarifying the spatial dimensions of innovation-driven firms, the study contributes to more responsive planning frameworks, regional economic competitiveness, and the retention of entrepreneurial talent within the Netherlands. The aim is to move beyond reactive planning and create a clear, supportive policy approach that helps scale-ups grow. This will help position them as key players in Europe's drive for sustainable and innovation-led growth.

ID: 178226

Start date: 01-09-2025

End date: 30-01-2026

Last modified: 29-09-2025

Space For Scaleups: Understanding how spatial dynamics shape the distribution of scale ups in the Netherlands

0. ADMINSTRATIVE QUESTIONS

1. Provide the name of the data management support staff consulted during the preparation of this plan and the date of consultation. Please also mention if you consulted any other support staff.

The DMP has been shared with my thesis supervisors Karel Van den Berghe and Peter Pelzer via DMPonline and via mail, and reviewed by them on 25-08-2025.

Janine Strandberg, Data Steward at the Faculty of Architecture & the Built Environment, has reviewed this DMP on 28-08-2025

2. Is TU Delft the lead institution for this project?

Yes, the only institution involved

I. DATA/CODE DESCRIPTION AND COLLECTION OR RE-USE

3. Provide a general description of the types of data/code you will be working with, including any re-used data/code.

Type of data/code	File format(s)	Collection / generation method and source (incl. reuse terms)	Purpose of processing	Storage location	Access
Firm-level em-ployment data	.csv, .xlsx	Re-used data from the LISA database (1996–2022), received by sub-mitting an application via the website	To identify and ana-lyse scale-up loca-tions and growth characteristics.	TU Delft OneDrive	Master's student Peter Baarda and supervisors Karel Van den Berghe and Peter Pelzer
Spatial zoning and land use data	.geojson, .shp, .gml	Public open data from PDOK and Kadaster	To analyse environ-mental and planning context of firm lo-cations.	TU Delft OneDrive	As above
R analysis scripts	.R, .Rmd, .txt	Scripts written by stu-dent in RStudio. They are selfwritten by the researcher.	To clean, filter, and analyse data and create visualisa-tions.	TU Delft OneDrive + external hard drive	As above
GIS visualisations	.qgz, .pdf, .png	Generated using QGIS based on processed firm and spatial datasets.	To create maps for interpretation and reporting of scale-up patterns.	TU Delft OneDrive + external hard drive	As above
Audio recordings	.mp3	Recorded on Teams or using a recorder if it is an interview in person. After recording they are moved to OneDrive. Recordings are deleted after transcription.	To create the inter-view transcripts and notes to do this research	TU Delft OneDrive + external re-cording device (if the inter-view is in per-son)	As above
Interview notes / transcripts	.docx, .txt	Generated by the research-er via semi-structured in-terviews by the use of Teams. Participants are asked to review the tran-scriptions of their interview before the transcript is finalised.	To understand spatial preferences of scale-ups and validate typologies.	TU Delft OneDrive + external hard drive	As above
Personally Identifi-able Information (PII): participants' name, email, work address, company name	.xlsx	Contact information for participants taking part in interviews, received through own network and internship company	To contact the persons and keep overview of the interviews	TU Delft OneDrive + external hard drive	As above
Informed consent forms	.pdf	Informed consent forms signed digitally.	To obtain and doc-ument informed consent.	TU Delft OneDrive + external hard drive	As above
Report	.docx	Serves as record of the process as well as documentation.	Documentation	TU Delft OneDrive	As above

II. STORAGE AND BACKUP DURING THE RESEARCH PROCESS

4. How much data/code storage will you require during the project lifetime?

< 250 GB

5. Where will the data/code be stored and backed-up during the project lifetime? (Select all that apply.)

Another storage system – please explain below, including provided security measures

TU Delft OneDrive

The data and code will be stored on TU Delft's OneDrive, with access restricted to the researcher and their supervisors.

Recordings will be made via Microsoft Teams or with an external recording device. In the latter case, the data will be securely transferred to OneDrive.

Additionally, a copy of the data will be stored on a local hard drive as a backup. This also provides the possibility to store personally identifiable information (PII) separately from the main dataset.

III. DATA/CODE DOCUMENTATION

6. What documentation will accompany data/code? (Select all that apply.)

Data – Methodology of data collection

The dataset will not be shared in a data repository, but the methodology of data collection will be *explained in the MSc thesis, which is made publicly available in the TU Delft Repository.*

IV. LEGAL AND ETHICAL REQUIREMENTS, CODE OF CONDUCTS

7. Does your research involve human subjects or third-party datasets collected from human participants?

If you are working with a human subject(s), you will need to obtain the HREC approval for your research project.

Yes – please provide details in the additional information box below

I intend to apply for ethical approval from the Human Research Ethics Committee, but have not yet done so.

8. Will you work with personal data? (This is information about an identified or identifiable natural person, either for research or project administration purposes.)

Yes, the research data collected in the project will be pseudonymsed, but processing of personal data is required for conducting the research project.

9. Will you work with any other types of confidential or classified data or code as listed below? (Select all that apply and provide additional details below.)

If you are not sure which option to select, ask your Faculty Data Steward for advice.

No, I will not work with any other types of confidential or classified data/code

10. How will ownership of the data and intellectual property rights to the data be managed?

For projects involving commercially-sensitive research or research involving third parties, seek advice of your Faculty Contract Manager when answering this question.

This is an internal TUD MSc thesis project.

11. Which personal data or data from human participants do you work with? (Select all that apply.)

Audio recordings

Proof of consent (such as signed consent materials which contain name and signature)

Telephone number, email addresses and/or other addresses as contact details for administrative purposes

Names as contact details for administrative purposes

12. Please list the categories of data subjects and their geographical location.

The participants of the focus group/interviews are professional in the domain of spatial planning and/or are topmanagement scale-ups. All participants are located in the Netherlands

13. Will you be receiving personal data from or transferring personal data to third parties (groups of individuals or organisations)?

No

16. What are the legal grounds for personal data processing?

Informed consent

17. Please describe the informed consent procedure you will follow below.

The researcher will inform the potential participants about the goals and procedures of the research project. The researcher will also inform them about the personal data that are being processed and for what purpose. A digital copy of the information will be emailed to participants before the interview, and all participants will be asked for their consent for taking part in the study and for data processing by signing a digital informed consent form before the start of the interview.

18. Where will you store the physical/digital signed consent forms or other types of proof of consent (such as recording of verbal consent)?

Digital informed consent forms and contact information are stored in the TU Delft OneDrive and encrypted separately from research data to minimise risk of re-identification.

19. Does the processing of the personal data result in a high risk to the data subjects? (Select all that apply.)

If the processing of the personal data results in a high risk to the data subjects, it is required to perform a Data Protection Impact Assessment (DPIA). In order to determine if there is a high risk for the data subjects, please check if any of the options below that are applicable to the processing of the personal data in your research project.

None of the above apply

23. What will happen with the personal data used in the research after the end of the research project?

Personal data will be shared with others – please explain below which personal (pseudonymised) data will be shared, with whom, for what purpose, how and whether you have specified this in the informed consent form. The pseudonymised research data consists of pseudonymised interview transcripts. These data will be used in the body of the thesis and included the appendix, but will not be shared in a data repository. For the rest personal data won't be shared unnecessarly.

24. For how long will personal research data (including pseudonymised data) be stored?

Other – please state the duration and explain the rationale below

Personal data will be deleted at the end of the research project

Personal research data will be sotred for the duration of the project + 1 month if no papers are planned on this research. And two years under the responsibility of my supervisor if any paper is planned.

25. How will your study participants be asked for their consent for data sharing?

In the informed consent form: participants are asked to give their explicit consent for sharing their (pseudonymised) personal data with restricted access with specific recipients for specific purpose(s)

All participants will be asked for their consent for data to be shared pseudonymised in the body of the MSc thesis, which is made publicly accessible in the TU Delft Repository. Participants who do not consent to their data being included publicly in the thesis will not be included in the research project.

V. DATA SHARING AND LONG TERM PRESERVATION

27. Apart from personal data mentioned in question 23, will any other data be publicly shared?

Please provide a list of data/code you are going to share under 'Additional Information'.

All other non-personal data/code produced in the project

29. How will you share research data/code, including those mentioned in question 23?

Select all that apply and provide additional details below.

I am a Bachelor's/Master's student at TU Delft and I will share the data/code in the body and/or appendices of my thesis/report in the TU Delft Repository

30. How much of your data/code will be shared in a research data repository?

Not applicable - No data/code will be shared in a repository

31. When will the data/code be shared?

As soon as corresponding results (papers, theses, reports) are published

32. Under what licence(s) will the data/code be released?

The thesis is made publicly available in the TU Delft Repository under copyright. The data are not shared in a data repository with a data licence.

VI. DATA MANAGEMENT RESPONSIBILITIES AND RESOURCES

33. If you leave TU Delft (or are unavailable), who is going to be responsible for the data/code resulting from this project?

My supervisor Karel Van den Berghe, Assistant Professor of Spatial Planning and Urban Development, with email address k.b.j.vandenberghe@tudelft.nl.

34. What resources (for example financial and time) will be dedicated to data management and ensuring that data will be FAIR (Findable, Accessible, Interoperable, Re-usable)?

Research data are only shared within the MSc thesis: no additional resources are required.

35. Which faculty do you belong to?

Faculty of Architecture and the Built Environment (ABE)

Appendix: Reflection

What is the relation between your graduation project topic, your master track (A, U, BT, LA, MBE), and your master programme (MSc AUBS)?

Although my graduation topic may seem somewhat unusual compared to many others, there is a clear connection between my research, my master track MBE and the AUBS master programme. My thesis explores the intersection between economics and space by examining innovative, fast-growing companies and considering how the Netherlands, or specific regions, should create spatial conditions that allow these firms to remain competitive globally. This aligns with the core themes of MBE, where we explore how real estate and management can support processes and enable people to live and work effectively.

It also fits well within the broader scope of AUBS, which addresses all aspects of the built environment. My project looks at economic dynamics specifically through a spatial lens regarding the built environment. Throughout the process, I frequently engaged with different spatial scales, local, regional, national and international, which has been a recurring theme in the programme and also in the Bachelor. And at last more generally, the analytical and creative way of thinking encouraged by both the track and the programme helped me connect different disciplines and look beyond the boundaries of a single field.

How did your research influence your design/recommendations and how did the design/recommendations influence your research?

Because my research is one of the first of its kind, the process was highly iterative. Before the summer, I had a completely different idea of what the project would become. Initially, I expected to develop clear typologies. Over time, however, I realised that scale-ups are far too diverse to be captured in simple categories. I learned that scale-ups are shaped by a wide range of underlying mechanisms that interact in complex ways. These mechanisms cannot easily be summarised in a single figure or model. Therefor my research influenced the recommendations and the research design quite a bit because I had to adjust the scope and design constantly.

As the research progressed, I also noticed that although broad patterns exist, it was sometimes difficult to make very specific recommendations at the scale I was working on. This occasionally resulted in conclusions that, in my view, could have been more in-depth. Still, because the project was exploratory and the data analysis and GIS techniques were not previously applied in this way, the design and the research continuously shaped each other. The process ultimately became retroductive, moving back and forth between theory, data and emerging insights.

How do you assess the value of your way of working (your approach, your used methods, used methodology)? How do I look back on the chosen methodology of quantitative research?

My approach was characterised by persistence and by generating very large amounts of data. I also worked in a pragmatic way. Within MBE, and in the Faculty of Architecture more generally, quantitative research is less common, so developing these skills was one of my personal goals. Over the course of my graduation, I learned to code in RStudio and taught myself ArcGIS. This was challenging but also gave me a lot of energy, because it allowed me to take on something completely new.

The drawback of this approach is that I may have sacrificed some depth at certain moments. However, I now possess valuable skills that I did not have before. Methodologically, I enjoyed working iteratively, the cleaning and analysing the data, exploring possible explanations and finally bringing everything together in the synthesis. I am naturally drawn to "higher" level investigation and exploring problems from many different angles. The difficult part for me was combining these perspectives into one coherent story, especially in a field like scale-ups, where limited knowledge exists.

How do you assess the academic and societal value, scope and implication of your graduation project, including ethical aspects?

Academically, I believe my thesis provides an important early contribution by focusing specifically on scale-ups rather than startups and by examining them over a ten-year period. As identified in my research gap, I aimed to create a foundation for understanding the spatial mechanisms behind scale-ups and to show that they should not be treated as isolated economic entities. They have a strong spatial impact, especially regarding employment, infrastructure and regional competitiveness in a small country like the Netherlands.

Societally, my research highlights that space and economy can no longer be viewed separately. Attracting scale-ups also requires appropriate spatial conditions and adequate facilities. Scale-ups contribute to national earning capacity, but only if the built environment supports their growth.

Regarding scope, I recognise that there was some scope creep. In the early phase, many elements were still unclear and I did not fully define the boundaries of my project. This caused some confusion later on. At the same time, approaching the topic exploratively allowed me to maintain an open perspective and examine all relevant facets. This led to diverse results and insights and reminded me why research can be so exciting. Ethical implications in this project were limited, as the work does not involve sensitive or high-risk topics.

How do you assess the value of the transferability of your project results?

My results are transferable, but with some critical nuance. The framework I developed is partly grounded in empirical data and partly in literature and this makes it applicable in a broader context. With the benefit of hindsight, I might have focused more narrowly on one core mechanism, which could have produced more specific findings that are easier to generalise. However, I consciously chose to develop an overarching framework because I wanted to highlight the broader theme of the relationship between space and economy.

Regarding transparency, I believe I have been open about my methodology and the limitations of the data. In this type of research, methodological transparency is essential, since the quality of outcomes depends heavily on the quality of the underlying data(sets).

How does the result relate to my personal P2 goals?

My P2 goal was: "My personal goal is to bridge the gap between different fields of study, gaining a deeper understanding of how different fields come together in one theme. I also want my research to contribute to a new way of thinking about growing businesses and innovation, one that bridges economy and spatial planning. A specific focus lies on the broader context, which does not stop at economic policy."

Looking back, I believe I achieved this. I gained a much deeper understanding of how business dynamics, economics and spatial planning interact. In my conclusion, I successfully bridged the gap between economic perspectives and spatial planning, building upon and complementing the approach taken by another knowledge institution TNO. I moved beyond purely economic policy considerations and focused on the spatial dimensions of scale-ups, including their location decisions and the types of space they require.

How do I look back on graduation?

Looking back, graduation was a process full of highs and lows. At some moments, I felt I was really contributing something meaningful, while at other moments I wondered what I was actually saying with my reseach. A few aspects stand out to me. Because I was still part of the "old" graduation programme, the first six months were dedicated to finding a topic. I started enthusiastically with something that genuinely interested me, which was geopolitics and the role of real estate within it. However, I quickly realised that researching geopolitics is essentially a PhD-level endeavour, something far too large to tackle in a master's thesis. I am therefore grateful that my supervisor Karel advised me to focus on scale-ups instead. This opened up an entirely new world of fast-growing companies that I previously knew very little about and ultimately it was a very good choice. And in someway I still adhered to to geopolitics, due to the innovative nature of scale ups and their importance to create innovation, which is one of the things Draghi (2024) notes as something important, we as Europe have to do.

Another element that stayed with me is how enjoyable it was to learn new software and that own your own pace. Gaining a basic understanding of data coding and working with GIS made me feel that the graduation process really expanded my technical skills. At the same time, one of the challenges of graduation is how solitary it can be. This has both advantages and disadvantages, but it also means you constantly question yourself. I often found myself wondering, what exactly am I producing here?

A final moment I remember clearly was just before my P3, when my supervisors asked me: "What is the story you actually want to tell?" It made me realise that perhaps I should have reflected on the storyline earlier, but it also taught me how important it is to keep the overarching narrative in mind throughout the process. Something I will take with me in my future career.

Overall, despite the challenges, I found graduation to be a great experience. The enthusiasm and support of both my supervisors played a major role in helping me push through the difficult moments and also made that I kept motivated throughout the whole process.

This thesis was written in fulfilment of the requirements for the degree of:

Master of Science
in Management in the Built Environment

at the Delft University of Technology,
January 2026

Peter Baarda
5062543

First supervisor: Karel Van den Berghe
Second supervisor: Peter Pelzer

TU Delft