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Urban dynamics in the Flemish countryside

A comparative study on morphological patterns and local economy dynamics

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urbanisation, rural areas, morphological patterns, economy dynamics

Abstract
The article examines two aspects of urbanisation in the rural areas of Flanders, the northern part of Belgium. On the one hand, the evolution of the built environment is studied in terms of built-up density and the corresponding morphological sprawl pattern, from the beginning of the 19th century up until now. On the other hand, the economy dynamics in the rural areas are investigated. This shift in economic activities can be seen as part of a broader urbanisation process, with aspects such as tertiarisation and broadening of agriculture.

The main driving factors behind these transformations are discussed based on literature study. It becomes clear that urbanisation of the countryside is the combined result of economic, physical, cultural and political evolutions. The comparative study in eight case municipalities with different spatial characteristics maps the evolution of the built environment and continuity of the economic activities. Temporal and regional differences are analysed and related to more location-specific driving factors. The sprawl pattern seems to have a historical ground, whereas the difference in density is related to the evolution path. Regarding the local economy dynamics, no clear regional differences can be found. The professions and other business services category has the highest density. The amount of tertiary activities proves the importance of tertiarisation on the countryside. Both studied evolutions tend to change the open space profoundly. Therefore, insights are crucial in order to develop location specific policies.

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1. Introduction

The condition of the Flemish countryside has been discussed a lot in recent years, in particular concerning the disappearing contrast between city and countryside. Many authors agree that both terms are ideals that no longer exist in Flanders (De Meulder et al., 1999; Xaveer De Geyter Architecten, 2002; Van Eetvelde and Antrop, 2005; Thomas et al., 2008). Elements of these ideals can be found scattered and fragmented across the Flemish landscape. The traditional boundaries between city centre and suburbs, city and countryside, and residential and rural areas have faded. What remains is a vague and chaotic spatial structure without any real notion of centrality, a dispersed field of 'urban sprawl', which is almost synonym of Flanders' settlement structure.

Within this structure, no 'real' or large continuous open spaces can be found. In a way urbanity has intruded the countryside throughout different urbanisation waves. Almost everywhere an urban influence is present, if not morphological, than in mentality and life style. Flanders can be seen as one big 'city', with scattered residential dwellings and a patchwork of open space. The so-called 'open space' is no longer a monofunctional open agricultural production area, but rather a complex spatial structure consisting of fragments with different densities and functions where people reside, work and recreate. It is difficult to understand this complex structure and little research has been carried out on the mechanisms of this evolution (Verbeek et al., 2010a).

In this paper, two aspects of urbanisation will be discussed. On the one hand the built area still seems to be expanding. This growth is the most obvious manifestation of urbanisation and has a significant impact on the remaining open space, not only by reducing it, but also by fragmenting it. Historical settlement patterns are affected by this transformation too. Throughout the different urbanisation waves, sprawl - and linear ribbon development in particular - has become an inherent aspect to Flanders' spatial configuration.

On the other hand, the economic activities on the countryside are shifting. Due to altering dynamics in agriculture and the increased mobility of people, goods and services - which allows businesses to become more and more footloose - the countryside has an increasingly non-agricultural economic dynamic (Verhoeve and De Roo, 2008; van der Knaap, 2002). Secondary sector businesses may be drawn to the countryside by the availability of space, whereas tertiary sector businesses may be looking for a more qualitative environment. The monofunctional agricultural production area has transformed into a more diffuse field of different types of economic activities.

Although these two transformations are intuitively and qualitatively widely recognised, an accurate quantitative and location specific insight is lacking. Regarding sprawl only general concepts, such as the idea of Flanders as a homogeneous urban sprawl area and the Flemish Diamond as the urban core region, are used to describe the Flemish condition. Also the extent and differentiation of economic activities in the agricultural area is little known. These profound changes however have important

spatial and economic consequences for the countryside. It is clear that the carrying-capacity of the open space is limited and that the expansion of the built environment and the differentiation of economic activities can pose important problems.
Therefore, the research relies on an extensive case study, which maps the settlement patterns and the rural economy dynamics in eight municipalities with different characteristics. It depicts the extent of these transformations and gives an insight into the typological differentiation of the phenomena, by focussing on the regional differences and the evolutions over time. In order to understand why these changes take place, the driving factors for these transformations - both general as well as regional specific - are analysed.
Because of Flanders' specific and dense urbanisation pattern, assessing these transformations in a Flemish context can open a relevant research for similar contexts in North-West Europe or other urbanised regions in the world.

The article starts with a very brief profile of urban dynamics on the Flemish countryside, followed by the main driving factors behind urbanisation in general and the current sprawl pattern in particular, based on literature study. Then, the methodology and the results of the case study are presented. Finally, the temporal and regional differences are analysed and related to the general factors of the first part and more location-specific factors, in order to understand the differences between the eight case municipalities.

2. Urban dynamics in the Flemish countryside

A. Urbanisation and sprawl: facts

The European Agency's report on urban sprawl in Europe (EEA, 2006) defines Belgium, the Netherlands, southern and western Germany, northern Italy and the Paris region as the areas in Europe with the most visible impacts of urban sprawl and this as a result of high population density and economic activity. Although the whole of Belgium is mentioned, urban sprawl is principally a Flemish phenomenon.
Within Flanders, a number of terms have been introduced to indicate this type of urban sprawl, each emphasising another aspect of the Flemish condition. Van den Bout and Ziegler (2003) use the term 'inhabited landscape', which is neither urban nor rural. De Cauter (2005) speaks about a 'post-urban, a-geographical city', in which people can live everywhere, as long as they are connected to networks, also known as 'cyburbia', the 'network metropolis', 'edge city' or the 'generic city'. Devoldere (2002) writes about the creation of an 'urban field', in which the term centrality is hollow and an expanding network of separate locations is created. De Meulder and Dehaene (2001) discuss a 'polynuclear urbanity', an open field in which everything is city. De Meulder et al. (1999) state that most parts of Flanders are in the same 'permanent isotropic peripheral condition', lacking a clear structure.

Today, only few places in Flanders seem to escape from this continuing urban development. Kesteloot (2003) has determined that approximately 70 percent of the Flemish population resides in an 'urban complex' - an area characterised by suburbanisation and by inhabitants commuting to and from one of the nine Flemish urban agglomerations or Brussels. Only 10 percent of the Flemish population lives in truely urban centres; the majority resides in a suburban environment, an urban 'conglomerate' (Vlaamse Overheid, 2004) resulting from the merging of historical city centres, urban agglomerations and banlieues (peripheries). The highest concentration of people is situated in the centre of Flanders in what is called the Flemish urban core region between the major cities Antwerp, Ghent, Brussels and Leuven, which makes this region one of the six larger urban regions in Western Europe[3] (Albrechts and Lievois, 2004). Only the communes outside of this core region, situated in the outermost western and eastern part of Flanders, seem to be escaping this evolution in a way. Nevertheless, Cabus (2001) estimates that 76 percent of Flanders still remains open.

Not only the morphological composition and spatial structure of the countryside have evolved dramatically. Also the corresponding functions of the countryside have changed profoundly. This dispersion of urban functions throughout the Flemish space is a historical phenomenon dating back to the Industrial Revolution.

An important aspect in this functional shift is the change in economic dynamics. The countryside is no longer a mainly agricultural production area, but also accommodates an important non-agricultural dynamic, both originating from internal dynamics (sidelines, broadening of agriculture …) as well as the attraction of external more 'urban' activities to the qualities of the countryside (availability of space, qualitative environment …) (Verhoeve and De Roo, 2008).

This differentiation of economic activities in the agricultural area is an irreversible dynamic with strong spatial and economic consequences (Verhoeve and Boute, 2009). However, little coherent and constructive policy actions are undertaken on this matter in Flanders. These policy decisions can nevertheless be crucial, as shown by the example of the Netherlands, where the government has already undertaken initiatives to play a steering role regarding this new reality ('ruimte voor ruimte' policy, national and provincial policy options related to new economic carriers, etc ...) (Verhoeve and De Roo, 2008).

B. Causes for urbanisation and urban sprawl

Economic growth, as often discussed in American academic literature (Ewing, 2008; Nicolaides and Wiese, 2006), is an important aspect that underlies urban sprawl. However, a merely economic explanation is not sufficient for the Flemish context. A large part of the urban sprawl in polycentric urban systems in general can be credited to the complex and historically evolving interaction between physical, cultural, political and economic features (Bruegmann, 2005 and Burchfield et al., 2006). In

[3] These are London, Paris, Rhine-Mainz, Rhine-Ruhr and Randstad.

what follows, an overview of these factors is given, although a clear separation between them is not always possible.

Economic and functional factors

According to Ewing (2008) and Nicolaides and Wiese (2006), low-density suburban development should be considered a 'natural' consequence of rising incomes, technological changes, low travel costs and high travel speeds. Rising personal income allows households to spend more money on travel and residential space, but also underlies the concept of spare time and leisure. Increased car ownership and the construction and improvement of highway and other infrastructure networks increase the accessibility of remote land, causing the urban boundary to shift outwards (Boonen and Smits, 2002). Therefore, it is no longer the spatial structure, but rather the communication structure which is determinant for location choice (van der Knaap, 2002).

Not only has the influence of the urban economy on the rural areas increased steadily throughout the last centuries. Also the changes from within the rural economy - especially agriculture - have made the countryside more open to this kind of economically driven urban transformations. International competition and European regulations have put agricultural business management under pressure. This leads to the restructuring and renewal of the agricultural sector and the individual farm company. Farms need to industrialise and increase in scale in order to keep up, or farmers take up side activities - also known as the broadening of agriculture - which sometimes grow out to be successful non-agricultural independent businesses and play an important role in the economic reorientation of rural areas. This way, the economic importance of production agriculture has decreased throughout the last century and agriculture, the traditional landscape carrier, has become less prominent on the countryside (Van den Bout en Ziegler, 2003; van der Wouden en van Dam, 2006), making it more susceptible to different types of economic activities.

Physical and geographical factors – historical settlement pattern

Flanders is physically, just like the Netherlands, a 'low country' situated in the delta of the rivers Rhine and Scheldt. Similar to most delta regions throughout the world, the Rhine-Scheldt region was and still is economically prosperous because of its fertile and productive soil and its potential to distribute economic goods from Europe to the rest of the world and vice versa. In medieval times, Bruges, Ghent and later Antwerp were important international trade centres that induced small and larger scale economic development all over the Flemish territory. Combined with the extremely favourable soil conditions that made it possible to build almost everywhere at very low costs, this unique position in Europe (and the world) resulted in a historical dense network of medieval cities and major villages at an average 25 km walking distance in between.

Worth mentioning is that, in some regions of Flanders, the initial medieval villages and hamlets already had a linear character due to physical features (soil and hydrological characteristics) and land cultivation strategies. Moreover, during the centuries that followed, they continued to develop in a

linear form along streams, roads, dikes, the sea ... (Gysels, 1993; Antrop, 2007). This illustrates how the historical and physically determined network of settlements has laid the foundations for the polycentric urban system of today.

In the present context, it is important to note that most of Flanders' territory can be quite easily cultivated, with the exception of the rather limited flood basins of the major waterways. Therefore, the most important current physical or geographical restraint in the development of the countryside stems not from the purely geographical conditions, but rather from the political protection of valuable natural infrastructures such as forests and nature reserves.

Socio-cultural factors

The changing perception of the countryside has also played a less obvious, though significant role in urbanisation processes. In the Middle Ages, nature was seen as a chaotic, hostile environment, that only served agricultural production. However, starting from the 19th century nature is seen as a qualitative living environment, not necessarily related to any agricultural function, as opposed to the unhealthy industrial city, which was demonised in the 19th century literature (Wagenaar, 1999). In the 20th century, the idea of the countryside as a good living and recreating environment grew, resulting in the ideal of the detached house with its own surrounding garden (De Meulder en Dehaene, 2001; Van den Broeck, 2001).

People are pushed away by the city's fuss, stress, complexity, congestion problems and drawn to the countryside by its peace, space, authenticity, small scale and social cohesion (Van den Bout and Ziegler, 2003; De Roo, 2000). However, this one-way movement is maybe too obvious and a lot of these good qualities stem from ideals which are projected onto the countryside. Its characteristics are 'upgraded' to qualities based on a social ideal. Sociologist Urry (1990) suggests that there is a relation between the disillusion of certain aspects of modernity and the current appeal to the countryside.

However this shift to the countryside as a good living environment is not per se followed by a 'countryside mentality'. Nio (2001) indicates that together with the urban landscape, urbanity as a social and cultural phenomenon changes. Urbanity seems to be no longer dependent on the physical form of the city, but rather is a mentality, a lifestyle which is more related to 'network' than to 'place' and spreads throughout suburban and rural areas.

This evolution is quite similar throughout the whole of West Europe. However the specific cultural mentality of the Flemish people also needs to be taken into account. Occupied for centuries by the Spanish and Austrian Habsburg Empire and by Dutch oppressors, 'Flemings' have grown a sort of common attitude to be very keen on individual freedom. Even today governmental regulations are in principle sceptically accepted and, if possible, circumvented. This more southern and Latin cultural mentality in Flanders is often mentioned as an explanation for the differences in spatial development with the more northern and Calvinist and planning minded and doctrinal mentality in the Netherlands (see for instance Faludi and van der Valk, 1994).

Political factors and the regulatory system

Last but not least, the scattered and linear residential development in Flanders has undoubtedly been politically promoted by a housing and economic policy that was mainly focused on dispersion (Boonen and Smits, 2002). In general, one could say that a lot of the socio-cultural factors described above were consistently given a legal framework by a coherent but unsustainable space policy. This long historical succession of political decisions is largely responsible for the famous Flemish linear residential development.

The seeds for an urban-sprawl-friendly policy in Flanders were already present in the 19th century when Belgian Christian and liberal politicians decided to develop a dense network of railways and roads in order to make the countryside easy accessible. This policy was strengthened by the governmental support for private ownership and individual, detached housing on the countryside via a subsidy and credit policy, at first only for the working class, but later on for the whole Flemish population, with the law De Taeye (1948). This policy was seen as an instrument to keep social peace within the working class, by avoiding unmanageable concentrations in the industrialised cities (De Meulder and Vandenbroucke, 2004).

When the very first land use plans for Belgium and thus for Flanders were drawn up in the 1970s, urban sprawl became institutionalized. Actually, one should have expected the opposite since these land use plans were a reaction of central government against the very willing allotment permit policy of municipalities in the years following the first Belgian law on urbanism in 1962. However, a large part of the then present ribbon-like sprawl was confirmed in the land use plans as 'residential area with rural character', not only giving existing houses a correct legal status, but at the same time making the residential development of non-built parcels laying in-between houses possible. Even today, forty years after the last land use plan has been approved, the legal supply of residential parcels in these residential areas still isn't exhausted.

Moreover, at the moment the first land use plans were approved, the parliament provided in another legal measure: the 'filling rule' ('opvulregel'). This rule made it exceptionally possible to build houses on land, although principally forbidden by the land use plan, when it was situated within a group of houses at the same side of a public road that already existed at the moment the land use plan was approved. The exception rule however became a general rule soon and was interpreted so freely, that the effects of this legal measure were far reaching (Renard, 1995). The 'filling rule' survived until 1993, creating residential development possibilities all over Flanders for more than 20 years. Since digital archives are missing, the quantitative impact of this rule is not completely clear.

In 1997 the Flemish government approved its first regional strategic planning document, the 'Spatial Structure Plan for Flanders', with a clear vision on the future spatial development of its territory: "Flanders, open and urban" (Albrechts, 1999). However, this new story line on planning in Flanders only could turn into a new, alternative planning discourse when it also became institutionalized,

amongst others through a new legislative framework (Hajer, 1995; Van Tatenhove et al., 2000). The new decree on urbanism and spatial planning of 1999, and its numerous later adjustments, has a rather ambiguous character with a strict view on the new planning instruments on the one hand and a far reaching building permit policy on the other hand. It extensively provides in possibilities to adjust, enlarge or rebuild so-called 'houses strange to the land use zone' or houses that are not situated in residential areas.
Finally, very recently in 2009, the Flemish parliament reintroduced the 'filling rule', albeit in a light version. The new rule allows building one additional house next to the blind outer wall of an existing house, regardless of the land use zone. Of course, the amount of new houses that will be built through the implementation of this rule won't be that enormous, but again this new political decision supports sprawl.

Summarizing this description, one can say that the Belgian/Flemish government could have planned urban expansion in a more strict and doctrinal way as is the case in the Netherlands. But apparently, over years politicians decided to do the opposite and support residential development all over the Flemish territory.

3. Objective and research questions

It is clear that a more objectified detailed insight in the current condition of the countryside is needed in order to refine and adjust these general findings. This insight can be a starting point for the development of a more specific policy.
Based on the previous observations, the following central research questions are formulated:

- Does some historical determination exist concerning the morphological pattern or is the pattern the result of recent evolutions?
- Which kind of economic activities characterise these rural areas? What is their role in the morphological development of the areas?
- Are there any differences in morphological patterns and local economy dynamics across Flanders' rural areas? What forces are behind these differences?

Based on these questions, the general focus of the research can be defined as the evolution of built-up surface and the spatial configuration of buildings on the one hand, and the economic activities of the secondary and tertiary sector on the other hand, and their mutual relationship on the countryside, defined as the rural municipalities without their historic centre, via case study in 8 municipalities.

4. Method

The evolution of morphological patterns and the local economy dynamics are researched through an extensive case study, respectively based on historical maps, starting with the 'de Ferraris' maps of the end of the 18th century and ending with recent cadastral plans, and the so-called VKBO database, an economic database which contains all registered Flemish companies. Both information sources are analysed in a GIS environment.

A. Focus

For the researched transformations, no directly usable statistics, data or digital maps are available on the scale of Flanders (Verhoeve et al., 2008). The processing of the historical maps requires an intensive digitalisation process and the database of business activities needs several editing, filtering, interpreting and checking procedures. This makes research on a generalised Flemish scale impossible. Therefore is chosen to detect the phenomena via in-depth examination of the study areas. Also, the case study methodology makes it possible to analyse the spatial differentiation of the transformations, in order to distinguish different forms and to shed light on the forces behind these different forms.

The municipal scale was chosen for the definition of the study areas. The selected municipalities were selected based on a research on mixed land use in Flanders (Leinfelder and Pisman, 2008). In this research different spatial typologies are distinguished, with specific open space and urbanization characteristics. Eight municipalities were chosen out of these types, spatially distributed over Flanders. Figure 1 shows their location.

- Low-dynamic open space under commuting pressure: Nevele and Boutersem
- Dynamic open space under recreation pressure: Brakel and Kasterlee
- Dynamic open space in a suburban field: Keerbergen and Lebbeke
- High-dynamic open space in an urban network: Kontich and Lendelede

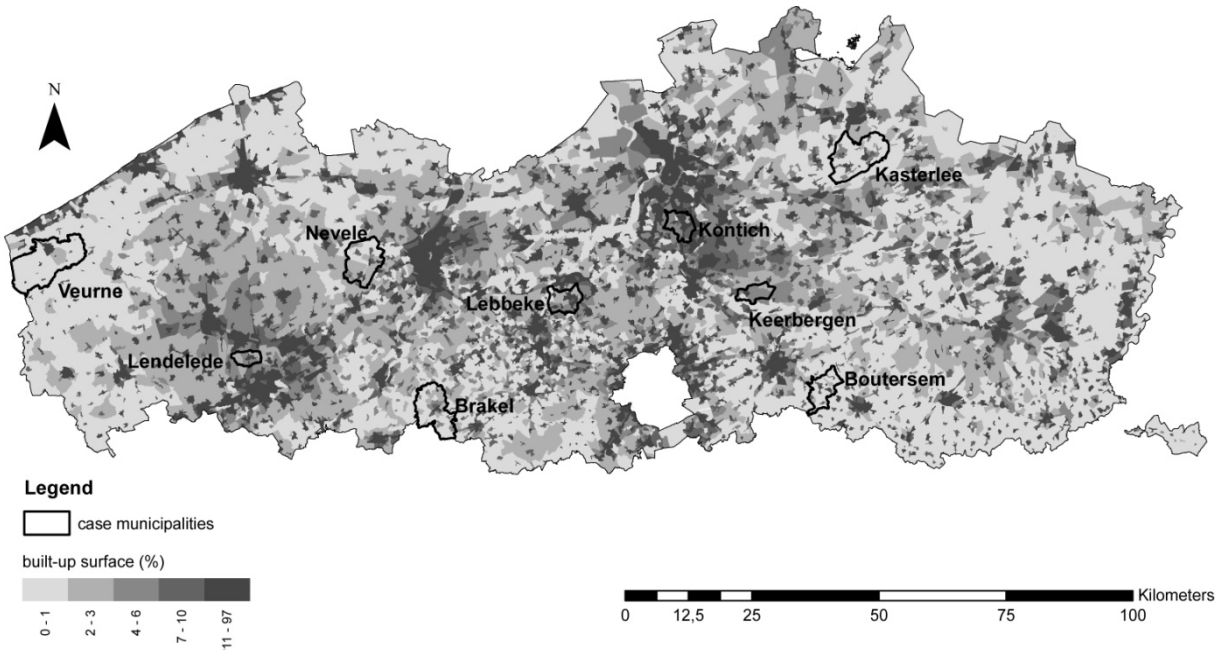


FIGURE 1. Location case municipalities on a built-up density map of Flanders

The main focus of this research is the countryside, defined as all areas outside of cities or town centres, or in other words, the rural municipalities without their historic dense centre. The proposed methodology however is applicable to other selections as well.
The delineation of the town centres is based on two datasets: the statistical sectors defined as residential centre by the National Institute for Statistics and the built-up centres ("bebouwde kern 2006") from the Mercator database as defined by TeleAtlas, a private digital mapping and navigation company. The statistical sectors represent morphological and social units and make a distinction between residential centre and countryside, but are not precise enough. The definition of built-up centres in the Mercator database is based on aerial photography. In general, this is a more limited delineation, but sometimes rural ribbons of buildings that are attached to the centre, but are not really part of it, are included. Therefore, a combination of both definitions was needed. Because of the interpretative nature of this kind of combination, it was done manually and case by case, so that ribbons of buildings or strikingly less dense parts could be excluded from the town centres.

The research component regarding the evolution of the morphological building patterns focuses on the built-up surface and the spatial configuration of the buildings. For the economy dynamics, the emphasis is on companies active in the secondary and tertiary sector, since these are part of a broader urbanisation process and cause an urban dynamic. Relevant here is the information concerning number, location, activity and age of the companies.

B. Data

The evolution of building patterns was analysed trough a range of historical maps, starting from the late 18th century up to the current situation (2009). The most important criterion for the selection of suitable maps is that they are drawn up systematically for all case municipalities, so that the series of maps is consistent and homogeneous within the same period of time. Furthermore, a meaningful time interval between two sets is essential.
These criterions led to the selection of the Cabinet Map of the Austrian Lower Countries - also known as the 'de Ferraris' map - as the first set of maps. These maps were drawn up between 1770 and 1778 and constitute the first systematic large scale map series for Flanders. This period also marks an interesting starting point for the analysis, at the end of the Ancien Régime, before the major transformations of the industrial revolution, modernisation and urbanisation processes, etc. This set is followed by three series of topographical maps, respectively dating from 1866-1950 (scale 1:20.000), the 1970's (scale 1:10.000) and the 1990's (scale 1:10.000). The time sequence ends with the cadastral plans of 2005 and 2009, the most recent data available.
The difficulty with this method is that the different map series were drawn up with different objectives and different techniques, so what features are considered important and how precise they are represented, etc. varies throughout the different series. Especially for the de Ferraris map, this is quite

important. There was no geometric-geodetic basis for mapping and the terrain mapping was done 'by pacing and on sight', so there are some important geographical deviations. Also, the maps show locally important non-systematic biases, mistakes and sometimes even imaginative interpretations, especially on the edge of the maps (Antrop et al., 2006). Although the quantitative information concerning the built-up surface is therefore not really reliable, these series of maps are an important source of information on the origin of the spatial configurations.
Starting from the next series of maps (1866-1950), mapping techniques had improved significantly and from this series onwards, inaccuracies were eliminated. The information was gathered by terrain mapping, so these maps show the *de facto* situation. Both quantitative as spatial configuration information is largely consistent throughout the different series.
The last two series of maps, the cadastral plans, show a slight inconsistency with the previous maps. The cadastral plan is a legal document and thus shows the *de juro* situation. On the one hand, the surface of registered buildings is very accurate; on the other hand, buildings without a building permit are not taken into account. This explains the overall decrease in built-up surface between the 1990's topographical map series and the 2005 cadastral plans.

The analysis of the economic activity is based on the VKBO-database (translated 'the Enriched Database for Enterprises'), which is available for the whole of Flanders. This database gathers basic information on enterprises based on several government databases. The VKBO database gathers the following data which are relevant for this research:

- name, business address, headquarters, legal status
- activities: codes, description and indication whether it is a main or side activity
- foundation date

Because the VKBO database is originally a legal document, it represents the *de juro* situation. This means that the database contains what entrepreneurs declare, but this does not necessary match the reality. For example, contractors and other firms sometimes set up multiple firms containing parts of what in fact is one firm, so in case one firm goes bankrupt, not all property is lost.
Also, a registered business address doesn't necessarily mean that an economic activity takes place at that address. Sometimes the stated business address is just the home address of the owner, because this is more interesting tax-wise or because it concerns self-employed people who generally work for other firms on location, such as architects, sports teachers, etc.

C. Data processing

Morphological patterns – Historical maps

To analyse the evolution of the morphology of the built environment quantitatively, digital data is required. The three most recent series rely completely on a georeferenced digital database. The first three however are analogue maps and need digitalising.

The digitalising process was done manually, because the automatic vectorising of the raster images didn't provide a sufficient result. Also, the vectorised shapes are heavily distorted, because of the grain of the original map, and therefore, the built surface information is not precise enough for further processing. Using image processing software, the buildings were filtered out of the map manually. This way, we obtained a map of the built-up surface for every time period. This information about the spatial configuration and surface of buildings in different time periods can be represented and processed in different ways.

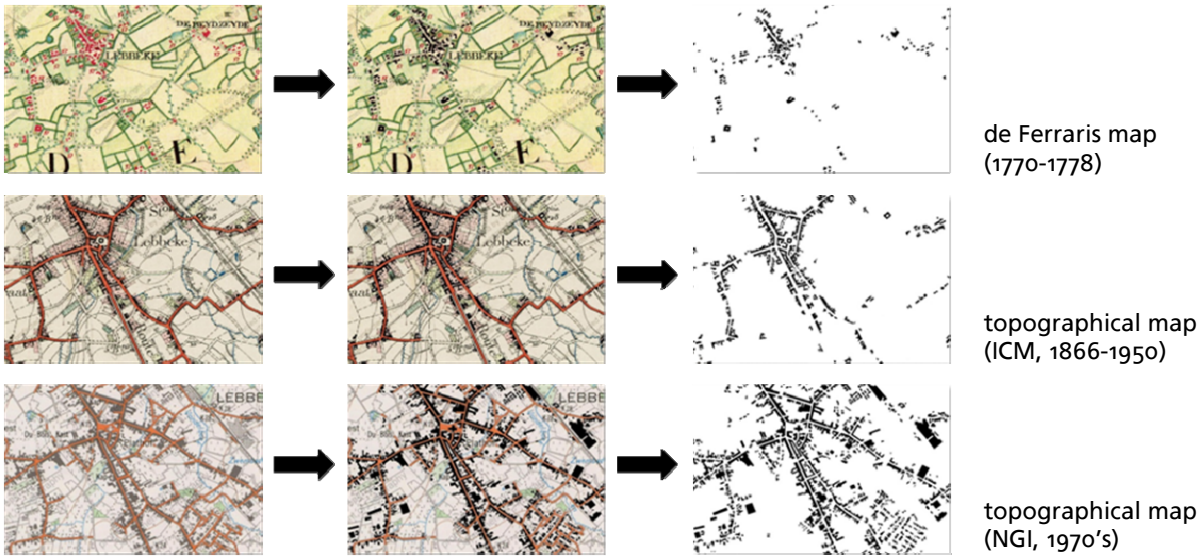


FIGURE 2. Processing of the analog historic maps - manual raster to vector conversion for a part of Lebbeke

For the statistical processing, the town centres and countryside were distinguished. Within the countryside, a morphological distinction was made between linear ribbon development alongside roads ('ribbons') and scattered development ('dots') (Figure 3), based on a research by Verbeek et al. (2010b). It is important to note that these distinctions are retrospective. The current town centre boundaries are used to divide town centre and countryside, even in the earliest maps. For ribbons and dots also, the current classification was used to select ribbons and dots in the historical maps. Of course, this is a simplification that creates a distorted image, especially for the town centres, since the evolution of the town centre boundary cannot be included, causing the town centre to be much less dense in earlier maps. However, this is not a problem since the focus is on the countryside.

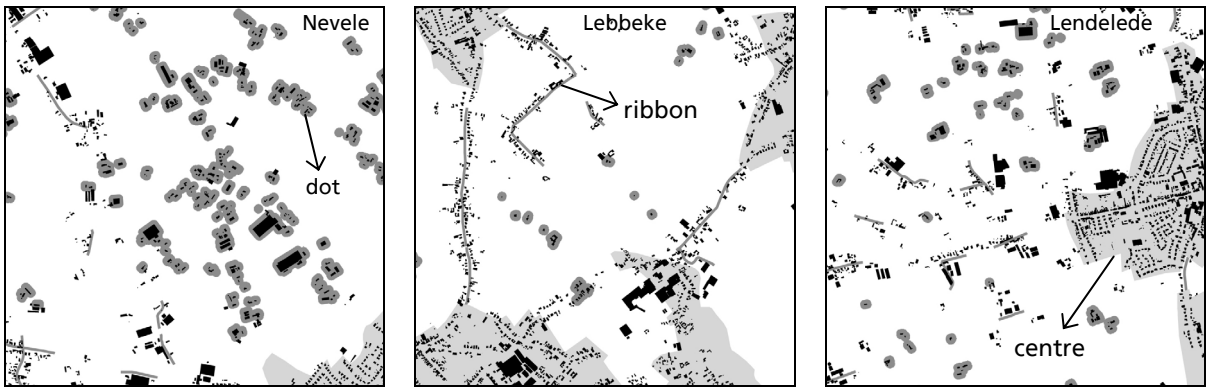


FIGURE 3. Morphological classification of the countryside (centre, ribbon and dot)

Economic dynamics – VKBO-database

To select the countryside companies, the VKBO database needed to be georeferenced. Since this database only contains addresses, the CRAB database (Central Address Reference File), which links address to geographical location, was used. Addresses that could not be georeferenced this way were localised manually. Then a selection of the companies in the countryside of the case municipalities was made using the boundaries described in A. Focus.

Based on the activity codes, company name and their activity in the 'Gouden Gids' - a telephone book for companies - the companies were classified according to their activity. The categories are:

- secondary sector
- tertiary sector:
    - retail and wholesale, including transportation
    - recreation, including catering and tourism
    - professions and other business services

These categories match the focus described earlier. The retail and wholesale sector were merged because they are both tied to a specific location, either by specific resources, a market or accessibility. The professions and other businesses on the other hand are rather footloose and usually quite small. The recreation businesses form a separate category because of their specific dynamics.

Furthermore the foundation date is taken into account to gain insight into the historical depth of the economic activities on the countryside. When processing this information, it is important to note that this type of information is retrospective and does not constitute an exhaustive historical overview of all the economic activities, since only companies that are active today are included.

In this transformation, three kinds of information are taken into account: location, activity and historical depth (foundation date). The combination of the first two types of information reveals the concentration and spatial distribution of the different activities throughout the different case municipalities. The average historical depth of a type of activity is an indicator for what is called the 'economic dynamic', indicating the amount of change it undergoes. If strikingly more companies in a sector or case municipality were created in the last five years in comparison to some decades ago, this indicates that the activity has a current economic dynamic, whereas an earlier average foundation date indicates less dynamic and more continuous activity. So the economic dynamic should not be confused with the aspect of the importance or impact of these activities on the countryside.

5. Results

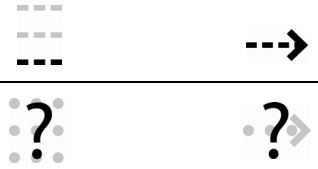
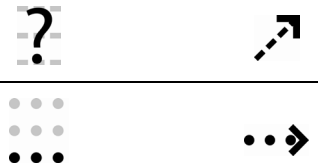
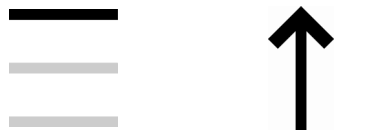
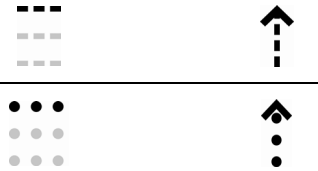
The analysis results in numerous building and activities maps. The focus of the paper will be directed towards the general resulting findings from this research. The first part gives an overview of the most relevant graphs of the quantitative aspects and the general characteristics revealed in the case study. In the second part an analysis of the underlying dynamics and driving forces is made.

A. Overview of the case study results

Some differences can be noted between the various spatial typologies of the municipalities. These are summarised in table 1 and 2.

Morphological patterns

The built-up density and morphological patters show a good overall correspondence with the predefined spatial typology. The overview gives information about the static situation (2009) and evolution (between 1770 and 2009), both for the countryside in general and the morphological patterns (ribbons and dots).

spatial typology	built-up density	morphology
low-dynamic commuting pressure (Nevele, Boutersem)		
dynamic recreation pressure (Brakel, Kasterlee)		
dynamic suburban field (Keerbergen, Lebbeke)		
high-dynamic urban network (Kontich, Lendelede)		

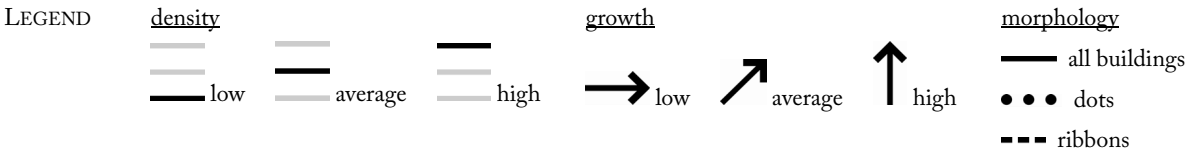


TABLE 1. Differences in morphology according to spatial typology of the countryside

Economy dynamics

For this aspect, no general statement could be made concerning the overall density of the secondary and tertiary activities, since there was little correspondence within the different spatial typologies. However, some similarities were found in the relative composition according to activity (table 2).

The overview gives information about the static situation (2009) of the business density (amount of businesses per address) and what is called the 'economic dynamic', indicating to the amount of change

the category undergoes. If relatively more companies are quite young, this indicates a lot of change so a high dynamic. A bigger amount of older companies indicates little change, called a low dynamic.

spatial typology	secondary sector		professions/other		recreation		wholesale/retail	
low-dynamic commuting pressure (Nevele, Boutersem)	=	↗	=	↑	=	↑	?	→
dynamic recreation pressure (Brakel, Kasterlee)	=		=		=		?	
dynamic suburban field (Keerbergen, Lebbeke)	?		?		=		=	
high-dynamic urban network (Kontich, Lendelede)	?		?		=		=	

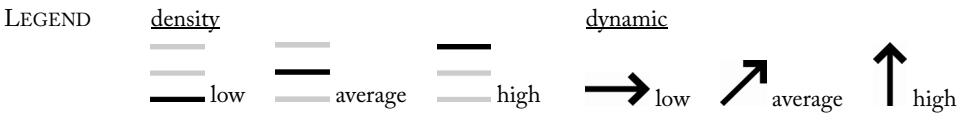


TABLE 2. Differences in economic activities according to spatial typology of the countryside

B. Micro scale analysis and underlying dynamics and driving forces

At a micro scale, some driving factors behind the researched transformations can be defined. For this analysis, we rely on the results of case study itself, the location within the general spatial structure, the spatial typology and some general knowledge about the different municipalities. However, comparing the findings with other base characteristics of the case municipalities could uncover more aspects. The revealed factors reoccur in the various micro study areas, but because of the qualitative intention and limited scope of the research, they remain hypothetical. Finally the relation between both transformations is discussed, as they can be driving forces to each other too.

There are two kinds of driving factors that situate them in the complex process of urbanisation. First, there are general or generic driving factors. These are forces active in the whole territory and thus not related to location. They can originate from general external factors, such as described in the literature study, or from inherent aspects of the general spatial needs – both functional and morphological - of certain functions. For example, industry requires sufficient space and a good accessibility for cargo transport for the distribution of the produced goods. The professions - as they are smaller in scale -

will rather search for a more qualitative and comfortable environment. Based on these factors, the general trends can be described.
However, these factors are not sufficient to explain the regional differences in the uncovered patterns. Therefore, the combination of time bound and location-specific aspects is needed. Since these are unique for different areas, they play an important role in the differentiated transformations of the Flemish countryside. The time bound factors are related to socio-economic, cultural, political and demographic processes with a certain evolution pace. Location specific factors concern local characteristics such as natural resources, (network) location, morphology ..., defining a specific place as the unique combination of a number of aspects.
The driving forces behind the spatial differentiation are a complex combination of all these aspects.

When discussing the **morphological evolution**, the following factors can be distinguished:

- location within the spatial structure of Flanders: The built-up density seems to be partly determined by the location within the Flemish urban core region and the proximity of other cities (graph 3). More 'rurban' or suburban areas have a higher built-up density with more ribbons of buildings, whereas more peripheral areas have a lower built-up density. No conclusions can be made concerning the presence of building dots.
- physical structure in combination with main functions/planning policy: As can be expected, the physical structure, especially the natural structure, seems to be quite influential in the morphological development. However, this aspect needs to be seen in the light of the main functions and the planning policy for these natural structures. For example, the woods in Keerbergen are used as a residential park, whereas the woods in Kasterlee are part of a recreational structure, and are thus protected more. Nowadays, natural structures are only to a limited extent structuring for the settlement pattern. However, policy can play an important role in protecting or developing these areas.
- existing built-up density and morphology (historical determination)
    . Built-up density does not seem to be determined by the historical density (Graph 1), meaning that originally relatively dense municipalities not necessarily result in dense municipalities today. Rather than the pre-existing situation, the built-up density seems to be dependent on the development path between the historical and current situation. Areas that have developed earlier (convex and straight curves in Graph 1) now have a higher built-up density, whereas areas that have urbanised more recently (concave curves in Graph 1) have a lower density. This might be explained by the fact that legal building restrictions are a recent phenomenon in Flanders (1970s) and were adapted to the existing situation, allowing development where buildings already existed (following policy).

. The morphological composition of the countryside is quite continuous, with building patterns going back to the 18th century (graph 2). Most current ribbon developments have some sort of historical background and have densified internally (adding buildings between others) and extended externally (adding buildings on the edge of the ribbon) throughout the decades. Completely new ribbons are exceptional.

  A historical clearly scattered pattern has the same kind of continuity, although dots seem to grow much slower, proving the importance of ribbon development in Flanders. Maybe this could be related to the fact that both patterns are dependant to the road network, which is rigid and changes rather slowly. Ribbons edge long straight roads, while dots will mostly occur in areas with a large mesh network of roads with a low density. So the dominant morphological building types will be quite continuous, while growth within the morphological type is possible. However, it should be mentioned that more recent morphological patters, such as low density allotments on the edge of the town centre are not taken into account here, since they are seen as part of the town centre.

. A general trend in recent decades is the systematic planning of low density allotments between the existing ribbons, bordering the approach roads of town centres, and in other 'gaps' in the morphological centre. This is often directed by a (municipal) policy of concentration, and more importantly, larger real estate projects.

Also the **economic dynamics** of open space seem to be influenced by some spatial characteristics. In general however, these relations are less obvious than those concerning the morphology.

- <u>location within the spatial structure of Flanders</u>: Although the amount of economic activities is not influenced by this aspect, the type of economic activities is (graph 4). It seems that little recreational economic activities can be found in the proximity of cities, while secondary sector activities can be found more in the peripheral areas and on the edge of the Flemish Diamond (graph 4).
- <u>relation to morphological evolution</u>:
  . Concerning the built-up density, it can be noted that less densely built areas attract relatively less secondary and tertiary economic activities, except for some very specific areas with a clear profile (graph 4).
  . A correspondence can be found between the time depth of the existing built environment and the type of economic activity. Areas that were densely built secondary centres between bigger cities with an important crossroad function in the 18th century, now have a lot of secondary economic activities, which are relatively old and have a low dynamic (graph 4). This can be related to their earlier development compared to more peripheral and agricultural municipalities. In areas that have

urbanised more recently, more professions and other business services with a greater dynamic can be found. This is consistent with the idea of tertiarisation as a more recent development.

6. Discussion and conclusion

This article argues that Flanders' urban sprawl is the combined result of a historical settlement pattern which already had linear characteristics, a cultural mentality that values individuality and private detached house ownership and a political promotion of dispersed residential development. Based on the results of the case study, it can be concluded that urban sprawl and non-agricultural economic activities indeed are actual and important phenomena on the Flemish countryside. Especially the non-agricultural economy and the regional differentiation of sprawl are underestimated. It is clear that there is no uniform Flemish countryside, but a range of different typologies. Therefore, location specific policies are needed, in strong contrast to the vision of the Spatial Structure Plan for Flanders, which focuses mainly on the urban rural dichotomy and less on the internal differences.

Focussing on regional differences and evolutions over time, a number of hypotheses were formulated to explain this differentiated pattern. When it comes to sprawl, the morphology or patterns are historically determined, while the difference in built-up density is dependent on the evolution path. Also the location within the Flemish urban core region or near cities causes a higher density with proportionally more ribbons. Concerning the non-agricultural economy on the countryside, little correspondence was found between the proposed typology and the density of non-agricultural businesses, proving that clear regional differences do not exist. The lack of directly usable datasets precludes a detailed insight into non-agricultural economic activities and indicates that the monitoring of these activities is not considered as important. A more solid database and a more profound insight could help setting out a policy for a disregarded, yet important dynamic on the countryside. However, some general conclusions could be drawn about the types of activities. The professions and other business services category has the highest density, showing the relative importance of this category. Also the amount of tertiary activities indicates that tertiarisation is an actual phenomenon that should not be underestimated. Further, there is a correspondence between the time depth of the existing built environment and the type of economic activity. Areas that developed earlier have more secondary sector businesses, which are relatively old and have a low dynamic, whereas more recently urbanised areas have proportionally more professions and other business services, a more recent type of activity with a greater dynamic.

An important aspect of the study is the restriction to a retrospective analysis due to the difficulty to gather historical information. For the morphologic analysis, the retrospective aspect lies in the choice to work with the current static boundaries of the town centres. However, this is not a big limitation, since the scope of the research is the current open space, and not the evolution of city centres. For the

non-agricultural economy however, working with retrospective information - time depth of currently active businesses - was not a choice, but a limitation of the available data. Here, an insight into the complete evolution of economic activities, including businesses which have already disappeared, would add significant information and facilitate the characterisation of the case study areas, resulting in a more complete and correct insight.

Further research is needed to determine whether the transformation to the countryside as a place for non-agricultural economic activities is problematic or not. It is clear that professions and other business services, which sometimes tend to be almost invisible, are generally smaller in scale and have a much smaller impact on the open space compared to the secondary sector and wholesale businesses, but more in-depth insights are needed. The central question to this matter is what kind of other dynamics, such as traffic, attraction of other functions ... do these non-agricultural activities cause? How does the countryside respond to the different activities? Verhoeve et al. (2008) proved that within the defined categories of activities the magnitude of the impact and the positive or negative assessment is not univocally related to their specific activities, such as a garage, a factory, a transportation company, etc., meaning that also within the category of activities quality criteria are needed.
Finally, the historical map series can be used as a base to look into the future. Both the revealed underlying dynamics – the building blocks for scenario thinking – as well as the comparison between subsequent time periods are possible tools.

Acknowledgements

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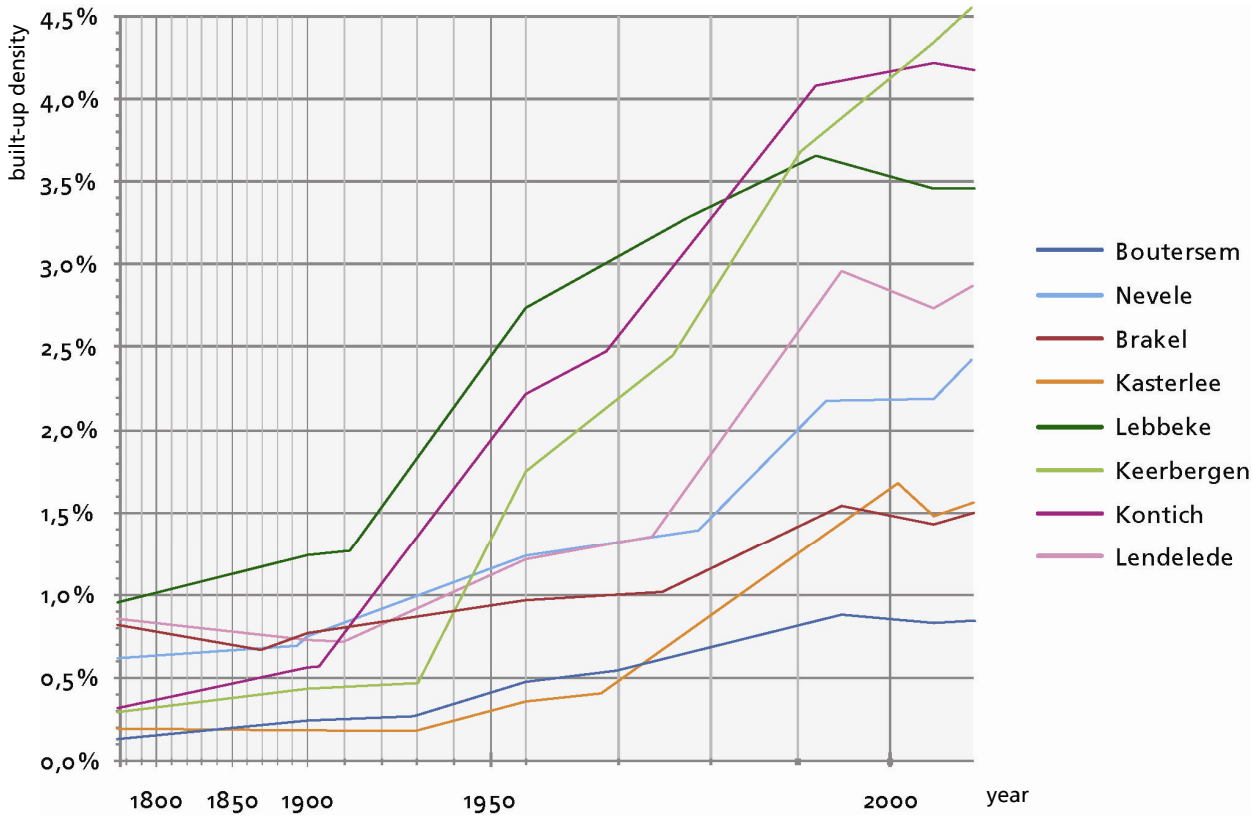
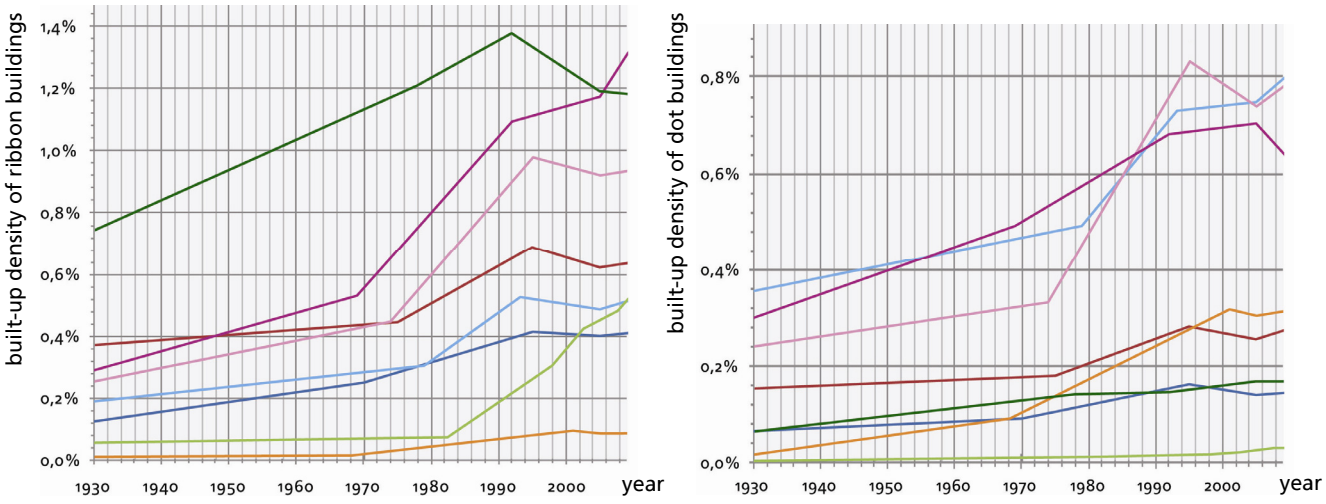
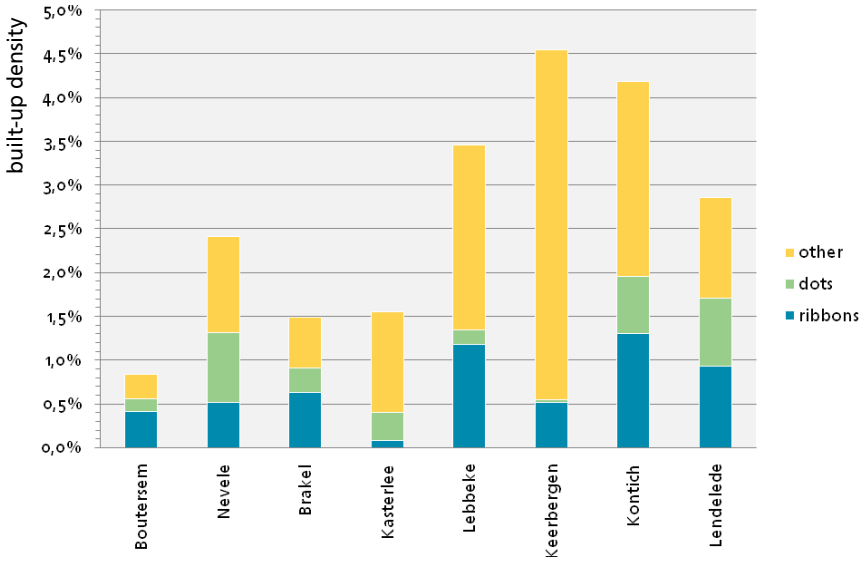
Annex (graphs)



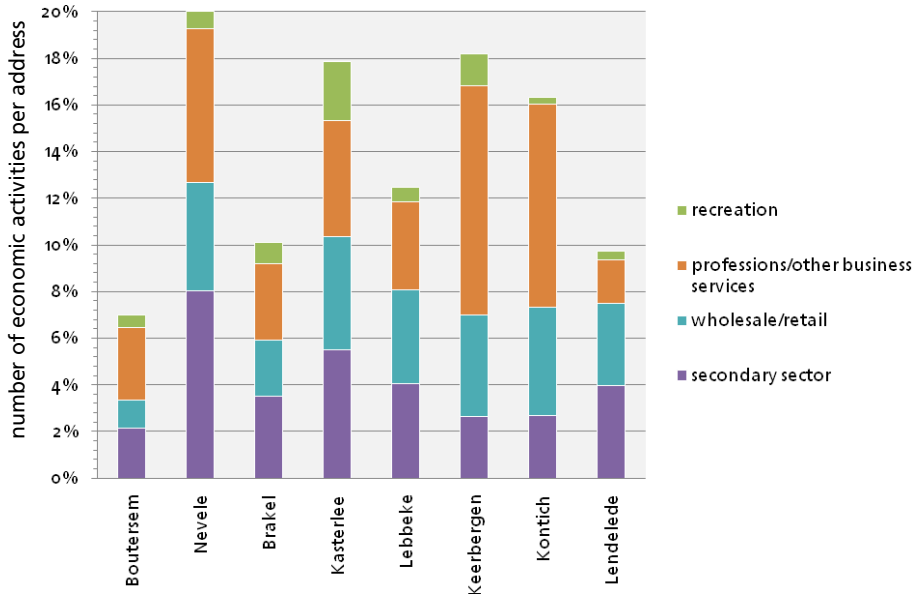
GRAPH 1. Evolution of the built-up density on the countryside in the 8 case municipalities



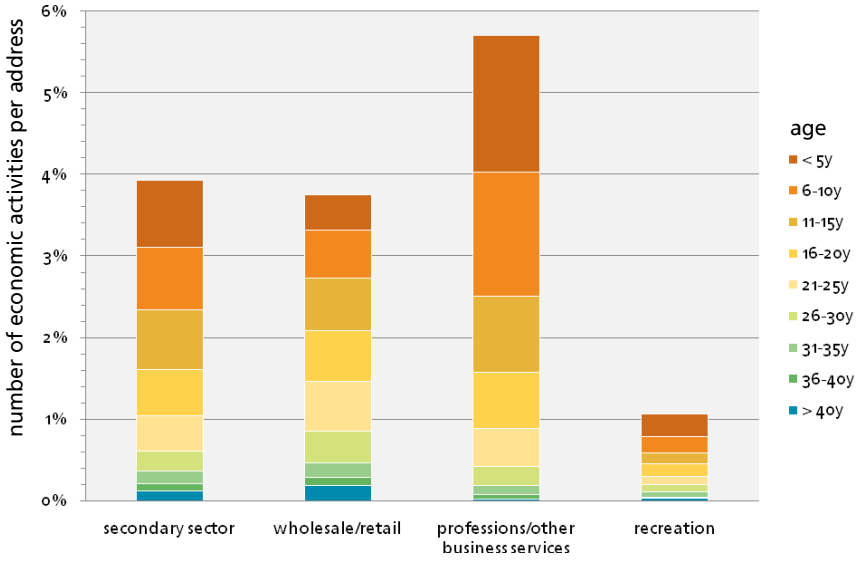
GRAPH 2. Evolution of the built-up density of ribbons and dots on the countryside in the 8 case municipalities



GRAPH 3. Morphological composition of the built-up density on the countryside in the 8 case municipalities (2009)



GRAPH 4. Business density on the countryside in the 8 case municipalities



GRAPH 5. Business density and time depth per activity on the countryside in the 8 case municipalities

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Cities without limits. 23–25 juni 2011, Kopenhagen, Denemarken
track 4. Resilient metropolitan landscapes

Stedelijke dynamieken op het Vlaamse platteland

Een vergelijkende studie over morfologische patronen en lokale economische dynamieken

Barbara Tempels[4], Thomas Verbeek[4], Ann Pisman[4,5], Georges Allaert[4] (promotor)

Kernwoorden
verstedelijking, platteland, morfologische patronen, economische dynamieken, open ruimte

Samenvatting
Het artikel onderzoekt twee aspecten van verstedelijking in de Vlaamse open ruimte. Enerzijds wordt de evolutie van de bebouwing bestudeerd in termen van bebouwingsdichtheid en het overeenkomstige morfologisch verspreidingspatroon, vanaf het begin van de 19de eeuw tot nu. Anderzijds worden de economische dynamieken in de open ruimte onderzocht. De verschuiving in economische activiteiten kan gezien worden als deel van een breed verstedelijkingsproces, met aspecten zoals tertiarisering en verbreding in de landbouw. Beide bestudeerde evoluties kunnen de open ruimte grondig en diepgaand veranderen. Inzichten zijn dus van cruciaal belang om gebiedsgericht beleid te ontwikkelen.

De belangrijkste drijvende krachten achter deze transformaties worden besproken, gebaseerd op een literatuurstudie. Dit artikel argumenteert dat urban sprawl in Vlaanderen het gecombineerde resultaat is van een historisch nederzettingspatroon dat reeds lineaire eigenschappen had, een culturele mentaliteit die individualiteit en privé-eigendom van losstaande woningen centraal plaatst en een jarenlange politieke ondersteuning van een verspreide residentiële ontwikkeling.

De vergelijkende studie in acht casegemeenten met verschillende ruimtelijke karakteristieken brengt de evolutie van de bebouwing en de continuïteit van de economische activiteiten in kaart. Tijdsgebonden en regionale verschillen worden geanalyseerd en gerelateerd aan meer locatiegebonden factoren. Gebaseerd op de resultaten van de case study kunnen we besluiten dat urban sprawl en niet-agrarische

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economische activiteiten inderdaad reële en belangrijke fenomenen zijn op het Vlaamse platteland. Vooral de niet-agrarische economie en de regionale differentiatie van sprawl worden onderschat. Het is duidelijk dat er geen uniform Vlaams platteland bestaat, maar eerder een verzameling van verschillende types. Daarom is er een gebiedsgericht beleid nodig, in sterk contrast met de visie van het Ruimtelijk Structuurplan Vlaanderen, dat hoofdzakelijk focust op de tweedeling tussen stad en platteland en minder op de interne verschillen.
Een aantal hypotheses, gericht op regionale verschillen en evoluties doorheen de tijd, werden opgesteld om dit gedifferentieerde patroon te verklaren. Wat betreft sprawl zijn de morfologie of patronen historisch bepaald, terwijl de verschillen in bebouwingsdichtheid afhankelijk zijn van het evolutiepad. Ook de locatie binnen de Vlaamse Ruit of nabij steden veroorzaakt een hogere dichtheid met proportioneel meer linten. Inzake de niet-agrarische economie op het platteland werd er weinig overeenkomst gevonden tussen de voorgestelde typologie en de dichtheid aan niet-agrarische bedrijven, waardoor er geen conclusies over regionale verschillen kunnen worden getrokken. Het gebrek aan rechtstreeks bruikbare datasets belet een gedetailleerd inzicht in de niet-agrarische economische activiteiten en toont aan dat het ruimtelijk monitoren van deze activiteiten niet als belangrijk wordt beschouwd. Een degelijke database en een meer diepgaand inzicht zouden kunnen helpen om een gebiedsgericht beleid op te zetten voor een onderschatte, doch belangrijke dynamiek op het platteland. Er konden wel een aantal algemene besluiten getrokken worden in verband met de types van activiteiten. De categorie vrije beroepen en andere zakelijke dienstverlening heeft de hoogste dichtheid (aantal bedrijven per adres), wat het relatieve belang van deze categorie aantoont. Het aantal tertiaire activiteiten toont ook het belang van tertiarisering in de open ruimte aan. Daarnaast is er een overeenkomst tussen de tijdsdiepte van de bebouwing en het type economische activiteit. Gebieden die zich eerder ontwikkeld hebben, hebben meer bedrijven in de secundaire sector die relatief oud zijn en een lage dynamiek hebben, terwijl meer recent verstedelijkte gebieden proportioneel meer vrije beroepen en andere zakelijke dienstverlening hebben, een jongere activiteit met een grotere dynamiek.

Een belangrijk aspect van het onderzoek is de beperking tot een retrospectieve analyse door de moeilijkheid om historische informatie te vergaren. Voor de morfologische analyse ligt het retrospectieve aspect in de keuze om te werken met de huidige statische grenzen van de gemeentekernen. Dit is echter geen belangrijke beperking, vermits het onderzoek zich richt op de huidige open ruimte, en niet de (uitbreiding van) dorpskernen. Echter, voor de niet-agrarische economie was werken met retrospectieve informatie (ouderdom van momenteel actieve bedrijven) geen keuze, maar een beperking van de beschikbare data. Een inzicht in de volledige evolutie van economische activiteiten, inclusief bedrijven die intussen reeds verdwenen zijn, zou belangrijke informatie toevoegen en de karakterisering van de casegebieden vereenvoudigen, wat zou resulteren in een meer volledig en correct inzicht.

Meer onderzoek is nodig om te bepalen of de transformatie van het platteland naar een plaats voor niet-agrarische economische bedrijven al dan niet problematisch is. Het is duidelijk dat vrije beroepen en andere zakelijke dienstverlening, die soms bijna volledig onzichtbaar zijn, over het algemeen kleiner zijn in schaal en een veel kleinere impact op de open ruimte hebben in vergelijking met de bedrijven uit de secundaire sector en groothandel, maar meer diepgaande inzichten zijn nodig. De centrale vraag hierbij is welke dynamieken, zoals verkeer, toekomstige ontwikkelingen, … deze niet-agrarische activiteiten veroorzaken? Hoe reageert het platteland op de verschillende activiteiten? Verhoeve et al. (2008) hebben bewezen dat binnen de gedefinieerde activiteitencategorieën de grootte van de impact en de positieve en negatieve waardering niet eenduidig gerelateerd is aan de specifieke activiteit, zoals een garage, een fabriek, een transportbedrijf, enz., wat betekent dat kwaliteitscriteria ook nodig zijn binnen een activiteitencategorie.

Niettemin is het in kaart brengen van de bedrijvigheid in de Vlaamse open ruimte een essentiële en belangrijke eerste stap in het blootleggen van deze vaak onderschatte economische dynamiek. Ook wat betreft de evolutie van de bebouwing levert het onderzoek belangrijke informatie op die niet enkel tot retrospectieve, analytische inzichten leidt, maar ook als basis kan dienen voor toekomstverkenningen.

Epiloog

Dit artikel kwam tot stand met de steun van de Vlaamse Gemeenschap: Programma Steunpunten voor Beleidsrelevant Onderzoek. In deze tekst komt de mening van de auteur naar voor en niet die van de Vlaamse Gemeenschap. De Vlaamse Gemeenschap kan niet aansprakelijk gesteld worden voor het gebruik dat kan worden gemaakt van de meegedeelde gegevens.