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RESEARCH ARTICLE

Artisans' chase for urban space. Clusters of construction entrepreneurs in Brussels, *c.* 1830–1930

Matthijs Degraeve[1], Heidi Deneweth[2] and Stephanie Van de Voorde[3]

[1]FWO Research Foundation – Flanders, Departments of History and Architectural Engineering, Vrije Universiteit Brussel, Brussels, Belgium
[2]Department of History, Vrije Universiteit Brussel, Brussels, Belgium
[3]Department of Architectural Engineering, Vrije Universiteit Brussel, Brussels, Belgium
Corresponding author: Matthijs Degraeve; Email: matthijs.degraeve@vub.be

Abstract
In contrast to the well-studied shopkeepers, little empirical evidence exists on the locational patterns of artisans in transforming urban spaces. By GIS mapping a dataset on Brussels construction entrepreneurs (*c.* 1830–1930), long-term changes in their patterns of spatial clustering and dispersal become clear, showing which urban areas provided advantageous conditions for artisans to thrive, but also how and when these conditions subsided. While confirming earlier observations of a broad scattering of artisans throughout the city, the analysis also shows how remarkable clusters emerged in cheap, densely built, both central and suburban neighbourhoods. The importance of clustering decreased over time, however. Confronting locational patterns with their potential underlying causes shows that planning policies for the renewal of urban infrastructure and the resulting dynamics on the real estate market acted as the first drivers of urban de-industrialization, affecting the displacement of artisans from inner cities since at least the late nineteenth century.

Introduction

In the rapidly expanding and industrializing cities of nineteenth- and early twentieth-century Europe, many of the essential needs of urban dwellers were, despite the development of mass production and distribution, persistently catered for by a vast group of self-employed artisans and shopkeepers, who remained working on a local and small-scale basis. For purchasing food, clothing, household items and furniture, but also for housing construction, renovation and repair works, many urbanites kept relying on the goods and services provided by ordinary retailers and craftspeople in their own neighbourhood.[1]

Full colour versions of the figures can be viewed in the online version (open access).

[1]G. Crossick and H.-G. Haupt, *The Petite Bourgeoisie in Europe 1780–1914. Enterprise, Family and Independence* (London, 1995).

Yet, despite their essential role within the urban economy, scholars long disregarded the place that these lower middle classes of artisans and shopkeepers occupied within an urban space that was strongly affected by long-term processes of urbanization, industrialization and de-industrialization. In studying the social geography of nineteenth- and early twentieth-century cities, most attention has been paid to the segregation between the two extremes of wealthy elites and impoverished working classes.[2] Whilst it was argued early on that this left the locational patterns of the middling sort out of sight,[3] digital methods of GIS-based analysis have only recently enabled scholars to revisit these discussions, reorient them away from the extremes of poverty and wealth and paint a more nuanced picture of how the presence and location of diverse middle groups was affected in a transforming urban society.[4]

Especially in urban historical research on the spatial distribution of shopkeepers, great progress has recently been made. Lesger,[5] Stobart[6] and others distinguished between two types of retailers, each with their own locational patterns. Retailers who provided durable and luxury *comparison goods* (for more than merely local needs and aimed at a wealthy clientele) were concentrated in central neighbourhoods and along easily accessible arterial streets, where consumers could compare various goods on display. The inner-city presence of these shopkeepers was reinforced in the nineteenth century due to urban renewal projects that aimed to fulfil the needs of the wealthy bourgeoisie. On the other hand, shopkeepers who provided *convenience goods* that addressed the urban population's basic needs, such as bakers and grocers, had to make way. They often relocated as pioneers into developing areas where they could cater for the daily needs of a newly emerging suburban population. As a result, shopkeepers of convenience goods were, and remained, scattered throughout the entire city.[7]

Recently still, this picture of a strong and increasing dispersion across the city has also been generally applied to small-scale artisans, who addressed equally dispersed daily needs of urban dwellers for individualized, handicraft production, renovation and repair work.[8] As sites of manufacturing, their small, scattered workshops contrasted heavily with the large-scale factories that clustered in industrial suburbs offering ample cheap space, low transport costs and agglomeration economies.

[2]E.W. Burgess, *The Urban Community* (Chicago, 1926); P. Knox and S. Pinch, *Urban Social Geography: An Introduction* (London, 2010), 157–8; R. Dennis, *English Industrial Cities of the Nineteenth Century: A Social Geography* (Cambridge, 1986), 3.

[3]L.D. Schwarz, 'Social class and social geography: the middle classes in London at the end of the eighteenth century', *Social History*, 7 (1982), 167–85.

[4]R. Rodger and S. Rau, 'Thinking spatially: new horizons for urban history', *Urban History*, 47 (2020), 1–12.

[5]C. Lesger, *Het winkellandschap van Amsterdam. Stedelijke structuur en winkelbedrijf in de Vroegmoderne en Moderne Tijd, 1550–2000* (Hilversum, 2013).

[6]J. Stobart, 'Shopping streets as social space: leisure, consumerism and improvement in an eighteenth-century county town', *Urban History*, 25 (1998), 3–21.

[7]For nineteenth-century Brussels, see E. Debackere, 'Winkelhouden in een hoofdstad. De vestigingsplaatsen van Brusselse winkeliers aan het begin van de negentiende eeuw', *Stadsgeschiedenis* (2013), 19–37; A. Arnout, *Streets of Splendor: Shopping Culture and Spaces in a European Capital City (Brussels, 1830–1914)* (Abingdon, 2018).

[8]Crossick and Haupt, *The Petite Bourgeoisie*, 116; G. Baics, 'The social geography of near and far: built environment and residential distance in mid-nineteenth-century New York City', *Urban History*, 47 (2020), 522.

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Historians studying the industrial geography of the city observed how the locational patterns of the latter featured a process of industrial suburbanization, followed by a gradual urban de-industrialization, in a movement of manufacturing towards the urban fringe from the middle of the nineteenth century on, thus preceding the actual disappearance of urban industries in the second half of the twentieth century.[9] While Lewis argued that, in North American cities, this movement was not limited to mass producing industries,[10] it remains unclear whether it also characterized the spatiality of artisan businesses addressing local daily needs in urban Europe.

This article focuses on these early processes of urban de-industrialization by questioning how they affected small-scale, labour-intensive artisan businesses catering to the city's essential needs. By evaluating their long-term locational patterns in the nineteenth and early twentieth centuries, it becomes possible to assess whether the presence of artisans in the city was characterized by an increasing scattering (similar to shopkeepers of convenience goods), or by a movement of manufacturing towards the urban fringe, featuring processes of industrial suburbanization and central urban de-industrialization (similar to large-scale industries). Especially with regard to the spatiality of small-scale urban artisans, the long-term effects of these processes have so far remained empirically understudied.

Like urban historians showed for shopkeepers, new digital mapping methods make it possible to point at dynamics of clustering and dispersal, which serve as a gateway to investigate the locational patterns of artisans in a transforming urban space. Long-term changes in the level of clustering, where clusters emerged and how they disappeared make clear which urban areas provided exceptionally advantageous conditions for small-scale entrepreneurship to thrive, but also how and when these conditions subsided. In this way, it also becomes possible to analyse the role of urban renewal, planning policies and gentrification dynamics as potential drivers behind urban de-industrialization processes: did they challenge the presence of artisans in some ways, or could artisans respond to opportunities that opened up in specific areas of a developing and transforming urban space?

To focus on the locational patterns of a broad and differentiated group of small-scale artisans, it is useful to zoom in on self-employed entrepreneurs in the construction sector. Entrepreneurs are defined here in broad terms as 'those responsible for undertaking a business activity',[11] including self-employed sole proprietors. In construction, they had little to no opportunities or means to mechanize their work, so most kept working as small-scale artisans with labour-intensive production processes that allowed them to address growing building and renovation needs. In a growing and industrializing capital city such as Brussels between *c.* 1830 and 1930, these needs drastically expanded, resulting in an explosive growth of self-employed entrepreneurs who worked as small-scale artisans in construction.

[9]R.D. Lewis, 'Industry and the suburbs', in R.D. Lewis (ed.), *Manufacturing Suburbs: Building Work and Home on the Metropolitan Fringe* (Philadelphia, 2008), 1–15; D. Vitiello, 'Machine building and city building: urban planning and industrial restructuring in Philadelphia, 1894–1928', *Journal of Urban History*, 34 (2008), 399–434.

[10]R.D. Lewis, *Manufacturing Montreal. The Making of an Industrial Landscape 1850–1930* (Baltimore, 2000), 1–22.

[11]R.J. Bennett *et al.*, *The Age of Entrepreneurship. Business Proprietors, Self-Employment and Corporations since 1851* (London, 2019), 5–9.

In the following two sections, we will further clarify this article's focus on the construction sector, and on Brussels between *c.* 1830 and 1930. We then elaborate on the sources of fiscal registers and annual trade directories that listed Brussels' construction entrepreneurs in four sample years (1833, 1866, 1899 and 1932), and on the GIS mapping process that enabled us to assign geographical co-ordinates to their addresses and perform a density analysis. This is followed by the results of this density analysis which – amidst a persistent reality of dispersion and scattering – expose the long-term existence and importance of some remarkable clusters of artisans in Brussels. To explain the causal factors behind their development, the final two sections focus respectively on the decline of an inner-city cluster in the Notre-Dame-aux-Neiges neighbourhood, and on the emergence of a suburban cluster in Ixelles.

Construction in urban history

As literal producers of urban space, the urban construction sector has already attracted a great deal of attention in urban history. Dyos stated that builders were an essential part of urban history,[12] and he has analysed speculative builders in Victorian London.[13] In the following years, much of the research on the nineteenth and early twentieth centuries remained focused on British cities.[14] More recently, the scope has also been expanded to other regions including North America and continental Europe.[15]

From these studies, some general features in the organization and composition of the building industry have become clear. The atypical production circumstances had a strong impact on the organization and scale of construction businesses. Unlike in most other industries, only a minor part of preparatory work took place in centralized production spaces such as workshops or factories. In construction, most of the work occurred on dispersed building sites, where the unique and individualized conditions required flexibility and left little room for economies of scale.[16] In Belgium, the proportion of enterprises with fewer than five workers declined only slightly from 88 to 84 per cent between 1890 and 1961.[17] As a result, the construction sector consisted of a large group of small-scale entrepreneurs who were specialized in a variety of building trades, such as painters, plumbers and bricklayers.

[12]H.J. Dyos, 'Agenda for urban historians', in H.J. Dyos (ed.), *The Study of Urban History* (Leicester, 1968), 87–112.

[13]H.J. Dyos, 'The speculative builders and developers of Victorian London', *Victorian Studies*, 11 (1968), 641–90.

[14]C.W. Chalklin, *The Provincial Towns of Georgian England: A Study of the Building Process, 1740–1820* (Leicester, 1974); J. Summerson, *The London Building World of the 1860s* (London, 1973); R.G. Rodger, 'Speculative builders and the structure of the Scottish building industry, 1860–1914', *Business History*, 21 (1979), 226–46.

[15]D.J. Rilling, *Making Houses, Crafting Capitalism. Builders in Philadelphia, 1790–1850* (Philadelphia, 2001); M. Martini, *Bâtiment en famille: migrations et petite entreprise en banlieue parisienne au XXe siècle* (Paris, 2016).

[16]C. Sabel and J. Zeitlin, 'Historical alternatives to mass production: politics, markets and technology in nineteenth-century industrialization', *Past & Present*, 108 (1985), 133–76.

[17]E. Buyst, *An Economic History of Residential Building in Belgium between 1890 and 1961* (Leuven, 1992), 132.

Construction entrepreneurs thus formed a vast and diverse group that held a unique position within the world of urban manufacturing. The atypical production circumstances, with the majority of the work taking place on site, also had distinct spatial consequences. On the one hand, it meant that construction enterprises had very limited spatial needs of their own. A small workshop or storage space often sufficed, if it was needed at all. For most construction entrepreneurs, their own residence could therefore function as the operating base for their enterprise: a compatibility of places of home and business that is an often-observed feature of small-scale entrepreneurship in the nineteenth century.[18]

On the other hand, on-site work also meant that space, transportation and location accounted for crucial considerations in the daily operations of construction entrepreneurs. Labour, equipment and materials had to be mobile, able to move from one site to another.[19] It required spatial proximity which, to a great extent, limited construction enterprises' range of operations. Whitehand has already stressed how, at least until the first half of the twentieth century, the urban construction sector remained strongly localized, tied to a certain city or urban agglomeration, where it catered almost exclusively to its own local market.[20] Moreover, since building and renovating remained a necessity in the city, it also meant that while other industries were starting to leave the city, construction often became the most important urban industry in the course of the twentieth century.[21]

On an intra-urban level as well, the mobility of production had repercussions for the location of a construction enterprise's operating base.[22] The scarce empirical research on locational patterns in the construction sector has focused on its relation with processes of suburbanization, showing how building artisans settled as pioneers in new urban neighbourhoods in order to efficiently provide their services to the developing surrounding area,[23] and how that attraction force of the demand side created a limited range of operations for construction enterprises, usually situated at the edge of growing cities.[24] The relation of construction with spatial processes of industrialization and de-industrialization has, on the contrary, not yet been explored, despite its potential to probe the long-term spatiality of small-scale artisan manufacturing in the city.

Building in Brussels, *c.* 1830–1930

To grasp the urban construction sector in its full complexity, the geographical scope is limited to a single city. Here, the focus is on Brussels. It serves as a representative case-study for a number of Western European cities that went through similar

[18]Crossick and Haupt, *The Petite Bourgeoisie*, 90–3.

[19]M. Buzzelli, 'The Canadian urban housebuilding industry: firm size structure and production methods in Ontario, 1945–2000', McMaster University Ph.D. thesis, 2001, 151.

[20]J.W.R. Whitehand, *The Making of the Urban Landscape* (Oxford, 1992).

[21]M. Degraeve, 'Building Brussels. Construction entrepreneurs in a transforming urban space (1830–1970)', Vrije Universiteit Brussel Ph.D. thesis, 2021, 105.

[22]Martini, *Bâtiment en famille*, 133–4.

[23]J.E. Abrahamse *et al.*, 'Gouden kansen? Vastgoedstrategieën van bouwondernemers in de stadsuitleg van Amsterdam in de Gouden Eeuw', *Bulletin KNOB*, 114 (2015), 244.

[24]J.W.R. Whitehand and C.M.H. Carr, 'The creators of England's inter-war suburbs', *Urban History*, 28 (2001), 244.

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urbanization and industrialization processes in the nineteenth and early twentieth centuries. Because their timing and impact varied significantly by city, zooming in on the specific context of a single city becomes all the more relevant.

Brussels was an early industrializing and rapidly urbanizing capital, where the transformations of the urban economy and space put large, growing demands on the construction sector. In 1830, it became the capital of the brand-new Belgian nation-state, reinforcing its role as the centre of political power that dated back to the sixteenth century. Numerous private and public institutions were established and resulted in a growing presence of bourgeois elites and middle classes who placed high demands on the construction sector. Simultaneously, Brussels became a commercial, financial and industrial hotspot. In 1832, early industrial development was propelled with the opening of a canal that connected Brussels with the southern coal region around Charleroi, and was linked by a sixteenth-century canal to Antwerp and the North Sea. From 1835 on, railroads also enabled the city to develop into the nation's main commercial and industrial hub.[25] Industrialization was grafted on the existing geographical layout of the city, with hills and elite neighbourhoods on the eastern side, and a western river and canal valley which accommodated most industrial activities.[26]

The resulting employment opportunities caused extensive and socially diverse migration flows to the capital. Population figures in the urban agglomeration increased from approximately 140,000 inhabitants in 1831 to around 900,000 by 1930.[27] In relative terms, the proportion of people living in Brussels to those in the entire province of Brabant increased from *c.* 25 per cent in 1831 to 52 per cent by 1930. To look at a phase of sustained urban growth, we focus on the period *c.* 1830–1930. After that, Brussels continued to grow until *c.* 1970, but at a slower pace, while the proportion of its inhabitants within Brabant declined to 50 per cent.

In such an expanding capital city, an extensive local economy quickly developed to cater goods and services for the daily needs of the urban population.[28] Housing needs were evidently among the most important ones to grow and diversify at a rapid pace. Demographic growth caused an unremitting urban development. From the early nineteenth century on, the city burst out of its fourteenth-century ramparts, following which, village after village was transformed into a suburb. For this article, the expanding scope of the sources allows us to take the growing urban agglomeration of Brussels into account, including the developing or fully urbanized municipalities that bordered on the city centre.

In the nineteenth century, the city centre also witnessed frequent redevelopments of its densely built, slum-like neighbourhoods, as will be illustrated below. The sanitation and embellishment of the inner city became top priorities to create an attractive residential environment for bourgeois elites and middle classes. In the early

[25]M. De Beule, *Bruxelles, une ville industrielle méconnue: impact urbanistique de l'industrialization* (Brussels, 1994).

[26]S. Vermeulen and E. Corijn, 'Gentrification or upward social mobility: the canal zone', in E. Corijn and J. Van de Ven (eds.), *The Brussels Reader. A Small World City to Become the Capital of Europe* (Brussels, 2013), 150–85.

[27]T. Eggerickx, 'Transition démographique et banlieue en Belgique: le cas de Bruxelles', *Annales de demographie historique*, 126 (2013), 51–80.

[28]G. Kurgan-Van Hentenrijk, 'Les patentables à Bruxelles au XIXe siècle', *Le Mouvement Social*, 108 (1979), 63–88.

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twentieth century, similar redevelopments took place to accommodate a railway connection and a central business district.[29] As a result of this enduringly high construction activity, the period *c.* 1830–1930 corresponds with an expansion of the Brussels construction sector in terms of its number of enterprises, which increased almost tenfold, from 956 in 1833 to 7,778 in 1932.

From sources to database, from addresses to GIS

Based on annual trade directories or 'almanacs',[30] which listed entrepreneurs per trade, we composed a database of construction entrepreneurs. We maintained a broad definition of the sector, containing both builders who worked on site, and those who worked (partly) in workshops for the preparatory production of building parts and components, in order to include the vast numbers of artisans who worked with iron and wood. These entrepreneurs were active in the Brussels urban area (including its suburbs) at the time of four sample years: 1833,[31] 1866, 1899 and 1932, each of which represents the timeframe of a construction boom in the capital.[32] From the 1860s on, the coverage of the almanacs improved.[33] To tackle potential shortcomings in the period until then, we supplemented the first two samples with construction entrepreneurs listed in the fiscal patent registers of the city of Brussels in 1831 and 1864.[34] Since 1795, people could undertake a commercial or industrial trade as an entrepreneur, if they obtained a patent by paying an annual direct 'patent' tax. The *registres des patentables* list tax-paying entrepreneurs per municipal district and street, with their name, address, trade, number of employees and fiscal class.

Because one enterprise could be mentioned in different occupational categories and sources for the same sample year, we assigned unique IDs to enterprises based on similarities in name, activities and location. In this way, we could determine how many individual enterprises were active in each sample year, the results of which are shown in Table 1.

Through the listed addresses, the resulting database includes information on each enterprise's location. After taking changes in street names, house numbers and municipal boundaries into account, the addresses received geographical X and Y co-ordinates. For 1833, they were manually mapped in GIS software onto a topographic parcel plan of 1835.[35] For the other sample years, we used geolocation software that automatically converted the addresses into geographical co-ordinates. Brussels Historical GIS (BHi-GIS), a tool developed by ULB IGEAT,[36] recognizes historical addresses based on the situation in 1866 for the city of Brussels (from Popp's cadastral

[29]T. Demey, *Bruxelles. Chronique d'une capitale en chantier. Du voûtement de la Senne à la Jonction Nord-Midi* (Brussels, 1990).

[30]Brussels City Archives (BCA), available online via https://archief.brussel.be/almanakken.

[31]Acquired via Anneleen Arnout (Universiteit Antwerpen – Centrum voor Stadsgeschiedenis).

[32]Demey, *Bruxelles. Chronique d'une capitale en chantier.*

[33]T. Debroux, 'Des artistes en ville. Géographie rétrospective des plasticiens à Bruxelles (1833–2008)', Université Libre de Bruxelles Ph.D. thesis, 2012, 105–7.

[34]BCA, *Registres des patentables*, 1831 and 1864.

[35]G.-B. Craan, 'Plan géométrique de la Ville de Bruxelles dressé en 1835', available online via https://gallica.bnf.fr/ark:/12148/btv1b53098622r/.

[36]Thanks to Tatiana Debroux and Didier Peeters (IGEAT-ULB).

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Table 1. Overview of the data on construction enterprises and firm locations used for the analysis (Data: BCA almanacs and patent registers)

Sample year	Source	Records	Unique enterprises	Total addresses	Located addresses (used for analysis)	Mapping method
1831	patent register	672	956	912	891	manual (GIS)
1833	almanac	737				
1864	patent register	948	2,696	2,715	2,507	BHi-GIS
1866	almanac	2,551				
1899	almanac	5,986	4,794	4,732	4,728	BHi-GIS
1932	almanac	8,302	7,778	7,807	7,588	BHi-GIS

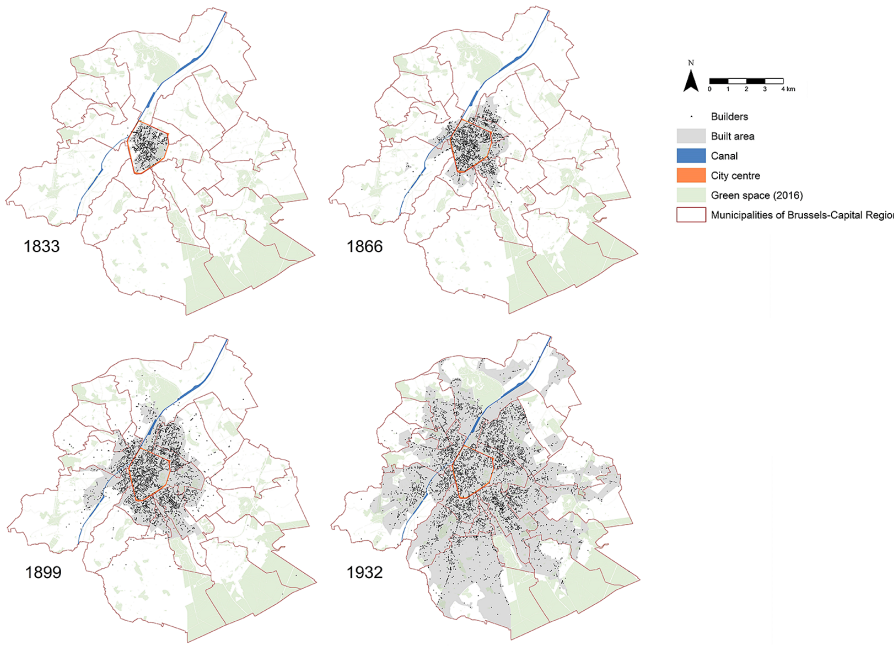

Figure 1. Mapping of construction enterprises in 1833, 1866, 1899 and 1932, on vectorized layer of present-day Brussels-Capital Region (BCR) (Data: BCA almanacs and patent registers, Background: UrbIS – datastore.brussels).

plan[37]) and in 1893 for Brussels and its suburbs (from a topographical map of the Military Cartographic Institute[38]) and assigns geographical co-ordinates to the addresses. Table 1 also shows the number of mapped addresses per sample year, visualized in the resulting maps of construction enterprises per sample year in Figure 1.

[37]P.-C. Popp, 'Plan parcellaire de la ville de Bruxelles', *Atlas Cadastral parcellaire de la Belgique*, 1842–79.
[38]Military Cartographic Institute, *Plan de Bruxelles et ses environs*, 1893.

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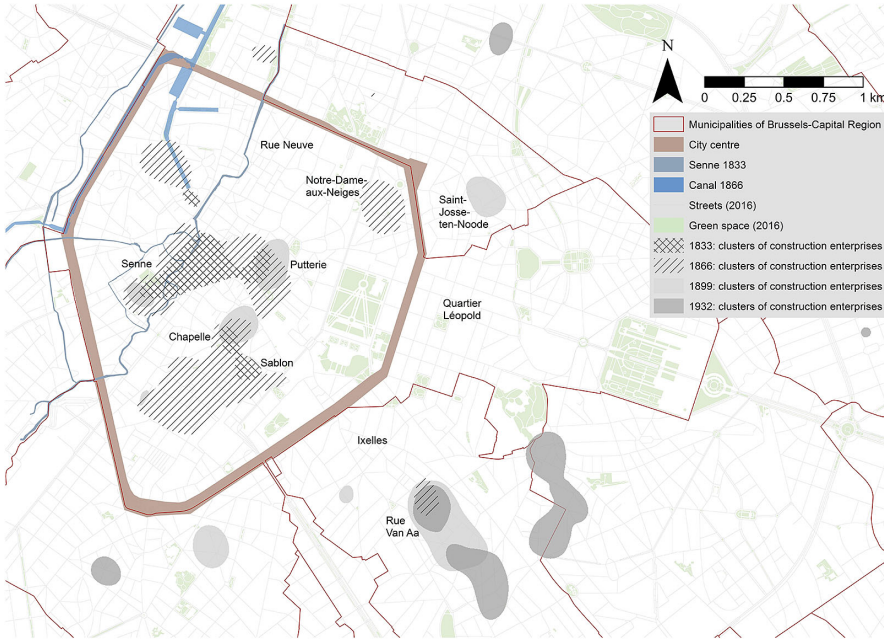

Figure 2. High densities (clusters) of construction enterprises (over 500 firms per km²) in 1833–1932 (Data: BCA almanacs and patent registers, Background: UrbIS – datastore.brussels).

Amidst this general image of scattering and ubiquity, advanced spatial analysis can uncover different degrees of spatial clustering. The GIS 'kernel density' tool calculates the density of features in an area around those features. A circle is drawn with a radius of 250 metres around every enterprise. Its surface value ranges from 1 at the location of the enterprise to 0 at the end of the radius distance. For each raster cell, the density is calculated by adding the values of all the circle surfaces overlaying that cell.[39] The resulting density values are divided in several classes with a specific interval of enterprises per square kilometre (km²). The degrees of concentrations range from low (less than 150 firms per km²) to standard (150–300 firms per km²) and high values (more than 300 firms per km²). Concentrations above 500 firms per km² can be considered as extraordinarily high in every timeframe and formed the few most important hotspots for construction enterprises in the city. In what follows, we refer to the latter as 'clusters' of construction enterprises. They are visualized in Figure 2 and analysed in the next sections.

Patterns of clustering and dispersal

Porter defined clusters as geographical concentrations of businesses and institutions from a certain field or sector, which are interconnected by spillovers of knowledge and technology.[40] More than a century earlier, Marshall similarly described how

[39]ArcGIS Desktop 9.3 Help, 'How Kernel Density works', in: http://webhelp.esri.com/arcgisdesktop/9.3/index.cfm?%TopicName=How%20Kernel%20Density%20works.

[40]M. Porter, 'Clusters and the new economics of competition', *Harvard Business Review* (1998), 77–90.

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agglomerations of sectorally specialized small and medium-sized enterprises were efficient because their proximity allowed them to benefit collectively from the presence of intermediary goods and services at low cost, a skilled labour supply and a common reservoir of technical knowledge and skills. As these dynamics surpassed the initial advantages of the territory, the agglomeration economies accumulated, an industrial district was consolidated and its firms became deeply locally embedded.[41] Specifically for the construction sector, Buzzelli and Harris pointed out how the urban dynamics of housebuilding can be understood by the framework of industrial districts, in which the rich and informal connections between dealers, builders and subcontractors are deeply embedded within the district.[42]

Whereas it is not possible, within the scope of this study, to assess interfirm networks of co-operation between construction enterprises that were located at close distance, the 'industrial district' theory provides a valuable hypothesis for why high spatial concentrations of artisans developed and persisted for a long time. Figure 2 visualizes kernel densities above 500 firms per km² for each sample year. Whilst some clusters existed only temporarily or shifted flexibly, others persisted for decades, providing suitable conditions for construction enterprises to become deeply locally embedded.

To assess the relative importance of construction enterprises that were clustered in the urban space, we calculated the proportions of the patterns of clustering and dispersal, as shown in Table 2. To the exact number of firms *within* the clusters (a), we added a weighted number of firms situated in a radius of 250 m *around* them (b) – as the kernel density analysis equally made use of such a radius around each firm location. In function of the distance to the nearest cluster, each firm location received a value between 1 (0 m distance) and 0 (250 m distance). The sum of these values serves as a weighted number of firms that contributed to the strength of a nearby cluster. Adding this to the number of firms *within* a cluster resulted in a number (c) and percentage (d) of construction enterprises that can be considered as 'clustered' within the urban space.

Based on this percentage of clustered firms, a first observation is that the majority of enterprises were well dispersed across the city. The maps confirm prevailing statements on the scattering and ubiquity of small-scale artisan businesses

Table 2. Overview of the data on clustering per sample year (Data: BCA almanacs and patent registers)

Sample year	Total located firms	Firms in clusters (a)	Firms within 250 m of clusters		Number of clustered firms (a + b)		Percentage of clustered firms weighted (d)
			total	weighted (b)	total	weighted (c)	
1833	891	127	*396*	269	*523*	396	44.5 %
1866	2,507	570	*885*	513	*1,455*	1,083	43.2 %
1899	4,728	310	*859*	425	*1,169*	735	15.5 %
1932	7,588	428	*622*	329	*1,050*	757	10.0 %

[41] A. Marshall, *Principles of Economics* (London, 1890), book 4, chapter 10; M. Bellandi, 'The industrial district in Marshall', in E. Goodman and J. Bamford (eds.), *Small Firms and Industrial Districts in Italy* (London, 1989), 136–52.

[42] M. Buzzelli and R. Harris, 'Cities as the industrial districts of housebuilding', *International Journal of Urban and Regional Research*, 30 (2006), 894–917.

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throughout the entire city. In every timeframe, there was barely any street or neighbourhood that did not count at least one construction enterprise. The limited capital and spatial needs for setting up a construction business ensured that businesses could be established wherever the entrepreneur lived. The resulting dispersion across the urban space enabled them to address highly local needs on construction and renovation sites in their own area. As such, this pattern corresponds with the historically observed dispersion of shopkeepers of convenience goods who addressed the daily needs of nearby urban dwellers.[43]

As the urban space expanded, construction enterprises also became less clustered. At least until the mid-1860s, almost half of all construction enterprises were clustered in the city, after which a strong decline occurred to only 10–15 per cent clustered firms. How did construction entrepreneurs end up more and more dispersed? On the one hand, pull factors were at play. In the developing suburbs, a growing population exerted strong and diverse housing needs, and a lot of construction activity took place, causing both existing construction businesses to relocate to the suburbs and businesses to be newly established there. On the other hand, the dispersion into the suburbs was also accelerated by push forces that either drove construction entrepreneurs out of the inner city or impeded business takeovers on central locations. Figure 2 shows that, as a result, every centrally located cluster had disappeared by the early twentieth century. To understand the push forces at play, however, it is first necessary to trace why these inner-city clusters had emerged exactly where they did.

In construction, the labour-intensive production process usually required little capital means for one to start out as a self-employed construction entrepreneur. A few tools and the ability to work on credit often sufficed.[44] As a result, instead of forming part of the expanding ranks of industrial capitalists, most construction entrepreneurs were petit-bourgeois artisans whose precarious wealth and social status barely exceeded that of their own wage labourers. This position at the bottom of the (lower) middle class heavily affected their agency and location in a transforming urban space. In accordance with their status, they usually searched for cheap, densely built areas, often on low-lying grounds, while barely gaining access to wealthy neighbourhoods destined for the urban bourgeoisie. In 1833, high concentrations stand out in central areas near the river Senne and in the Putterie district, two popular and densely built areas, whereas builders were largely absent in the northern bourgeois district on and around Rue Neuve (Figure 2).

For 1866, the determining force of local differences in real estate values on the formation of clusters of construction enterprises can be verified in detail via the cadastral ledger for the city of Brussels from 1865. In the Belgian cadaster, the ledger (series 212) lists all parcels per proprietor, along with every parcel's cadastral income. As an estimated net annual income a house could potentially yield by renting it out, the cadastral income stands for the rental value of a house and served as the basis for the land tax rate, so it can be considered as a proxy for the wealth of owners and tenants. Between 1840 and 1880, Popp published the *Atlas cadastral parcellaire de la Belgique* containing the cadastral ledger and detailed topographical plans for nearly every Belgian municipality.[45] For the city of Brussels, it was published in 1865, and

[43]Lesger, *Het winkellandschap van Amsterdam*; Stobart, 'Shopping streets as social space'.

[44]F. Wellings, *British Housebuilders: History and Analysis* (London, 2008), 138–41.

[45]S. Vrielinck, *Grootse plannen. De kadastrale Atlas van België van P. C. Popp: genese en datering (1840–1880)* (Amsterdam, 2018).

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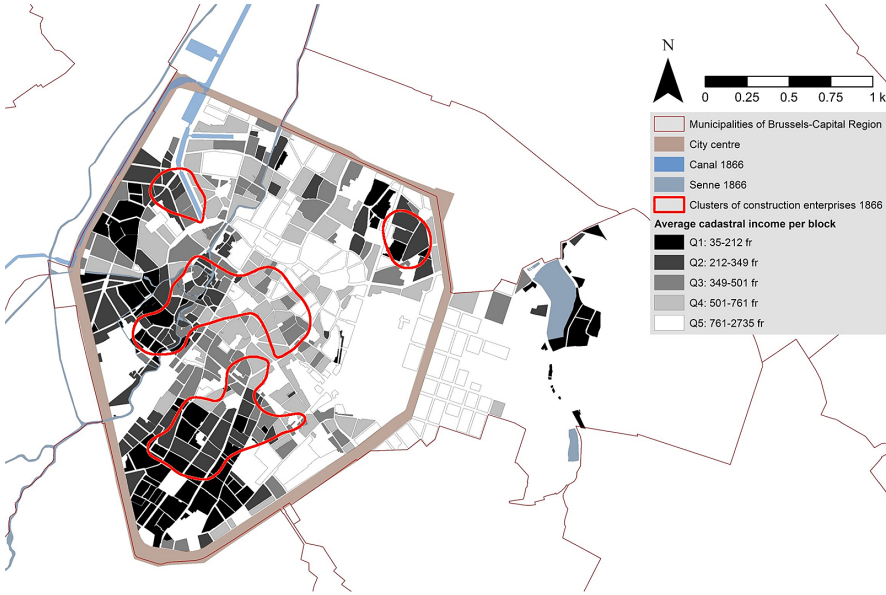

Figure 3. Clusters of construction enterprises compared to the city's social geography in 1865/66 (Data: POPPKAD Ghent University).

recently digitized in the POPPKAD database.[46] As it is connected to a GIS layer with Popp's vectorized cadastral plan, it is possible to map the cadastral incomes. They are visualized per building block in quintiles in Figure 3, and provide not only great insight into the city's social geography, but can also be confronted with the clusters of construction enterprises in the city, indicated in red.

By 1866, the high inner-city concentrations of construction enterprises had strengthened and expanded in lower-middle-class neighbourhoods. The cluster in the Senne-Putterie area was situated in a highly mixed zone that verged on more homogeneous neighbourhoods for either working classes or urban elites. The same went for the expanded concentration near the Sablon and Chapelle, and for new ones in the north-western port area and in the north-eastern Notre-Dame-aux-Neiges neighbourhood. By contrast, the wealthy area that stretched from Rue Neuve in the north to the eastern area around the court and into the developing suburban Quartier Léopold attracted few construction entrepreneurs.

An inner-city cluster in decline: Notre-Dame-aux-Neiges

In 1866, almost half of all construction entrepreneurs thus clustered in relatively cheap neighbourhoods that fitted their social status. However, from the later nineteenth century on, many of these inner-city areas became the focal point of the local and national authorities' efforts to embellish and redevelop the capital in order to

[46]Thanks to E. Vanhaute, S. Vrielinck and T. Wiedeman, Historische Databank van Kadastrale Statistieken POPPKAD, Queteletcentrum voor Historische Statistieken, Universiteit Gent.

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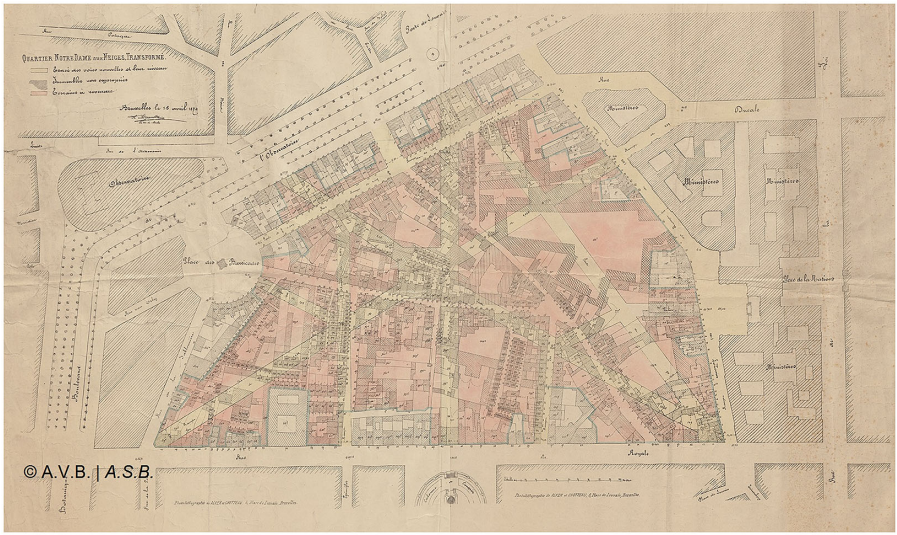

Figure 4. Projection of new streets on the existing fabric of the Notre-Dame-aux-Neiges neighbourhood, 1874 (east on top) (BCA, Public Works, 350). Any reproduction, in whole or in part, by any method, without the permission of the Archives of the City of Brussels, is unlawful.

accommodate the housing needs of the urban bourgeoisie. As Reick[47] and Kadi and Matznetter[48] recently observed for late nineteenth-century Berlin and Vienna respectively, it was the age of 'Gentrification 1.0', and that was also the case in Brussels. The drastic redevelopments of its physical urban infrastructure, as well as the associated social and economic transformations of these neighbourhoods, eradicated the favourable spatial context for small-scale artisan entrepreneurs, with the long-term disappearance of their centrally located clusters as an inevitable consequence.

A good example can be observed in the Notre-Dame-aux-Neiges neighbourhood, in the north-eastern part of the Brussels city centre. In this area, much of the still unbuilt land in what had long been the urban periphery was developed in the first half of the nineteenth century into a densely built slum district with narrow alleys and cul-de-sacs housing a growing working-class population. As sanitary conditions became increasingly distressing, the neighbourhood ended up at the centre of attention in the local government's efforts for the sanitation and embellishment of the inner city, through which it aimed to preserve an attractive living environment for the bourgeoisie and put an end to their suburban exodus. In 1874, a private company was established to operationalize the redevelopment, the 'Société Anonyme du Quartier Notre-Dame-aux-Neiges'. In 1875 and 1876, existing houses were expropriated and demolished. The company took care of the levelling works, sewage and road construction, but it also developed some plots to stimulate the neighbourhood's redevelopment. As shown in Figure 4, a new urban fabric came about, structured around a central 'Place de la Liberté' and four broad, radial axis streets, along which modern

[47]P. Reick, 'Gentrification 1.0: urban transformations in late-19th-century Berlin', *Urban Studies*, 55 (2018), 2542–58.

[48]J. Kadi and W. Matznetter, 'The long history of gentrification in Vienna, 1890–2020', *City* (2022), 1–23.

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bourgeois residences and monumental public buildings were erected, which gave the neighbourhood a distinctly Haussmannian appearance.[49]

Debroux *et al.* recently observed how this physical urban transformation also provoked changes in the socio-economic characteristics of the neighbourhood.[50] They compared the area's socio-professional composition before and after its redevelopment, in 1865 and 1893, using the aforementioned almanacs, in which a part arranged by street listed the occupation of the head of each household per address. Although the presence of working classes and female occupational activities was under-recorded, the almanacs provide a basic insight into an urban area's socio-professional composition. Between 1865 and 1893, a heterogeneous elite and middle-class group of white-collar workers, merchants, liberal professions, officers, bankers, industrialists, rentiers and landowners expanded from 15 to 65 per cent of the neighbourhood's population. The proportion of shopkeepers slightly increased from 21 to 23 per cent, since many (though a very different kind of) shops had to cater for the needs of nearby bourgeois residents. With the demolition of the area's cul-de-sacs, working-class families went from 41 per cent (probably an underestimation) to a mere 0.2 per cent of the neighbourhood's inhabitants.

The neighbourhood also housed a large and heterogeneous group of artisans. Their presence was almost halved, from 23 to 12 per cent, between 1865 and 1893. While working-class households mainly lived in the inner courtyards and alleys, artisans were better represented on the main streets, where especially the presence of construction entrepreneurs had risen significantly in the decades before the area's redevelopment. Using the same method as Debroux *et al.*, we found that in 1833, still only 10 per cent of the houses on the two main streets in the area (Rue Notre-Dame-aux-Neiges and Rue de la Batterie) accommodated a construction enterprise, accounting for fairly average concentration levels of around 200 to 300 firms per km². In the following decades, however, the proportion of construction enterprises on these streets rose to 15 per cent by 1848 and to 19 per cent by 1866. By then, they formed the core of one of the city's main clusters with locally over 700 firms per km².

The cluster had emerged in response to the growing construction activity in the capital. In the decades between 1833 and 1866, the area was quite cheap and still fully developing, so many small workshops could be accommodated, used by a variety of building artisans, such as marble workers, plumbers, glaziers, joiners and lock and stove smiths. Together with several painters, bricklayers, plasterers and roofers, who rather worked on-site, they benefited from a convenient location on the edge of the inner city, near the developing suburbs of Saint-Josse and Brussels' uptown extension, the Quartier Léopold, where a great deal of the city's construction activity was situated.

This broad variety of building trades was typical for all clusters in the city. It shows that it makes little sense to differentiate internally within the construction sector, and suggests that, next to Marshallian externalities that arose among manufacturers active in the same industry, so-called Jacobs' externalities were possibly at play. Jane Jacobs argued that economically diverse spatial clustering also generated spillovers across different industries that co-operated intensely,[51] which was in particular the case between the highly interdependent building trades.

[49]Demey, *Bruxelles. Chronique d'une capitale en chantier*, 1:98–120.

[50]T. Debroux *et al.*, 'La production d'ensembles résidentiels élitaires (Bruxelles XVIIIe–XXe siècles)', *Genèses*, 99 (2015), 69–92.

[51]J. Jacobs, *The Economy of Cities* (New York, 1969).

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Whilst less affected than working-class families, these builders also had to make way for the neighbourhood's renewal in the 1870s. By 1878, not a single construction entrepreneur was listed in the almanacs on the two mentioned streets. By 1899, a low concentration of 100–150 firms per km² had reappeared. Very few construction entrepreneurs were wealthy enough to be able to reside amidst their bourgeois clientele. It can be questioned whether they, unlike the poor working classes, did not profit from the redevelopment through the expropriation fees for landowners. The petite bourgeoisie is after all well known for their role in home ownership and in (speculative) housing developments to house the working classes,[52] especially by construction entrepreneurs whose financial involvement on the real estate market often naturally ensued from their business activities.[53] The POPPKAD database shows that, in 1865, one third of the construction entrepreneurs in this area owned real estate in the neighbourhood, and a fifth owned more than their own home. While from 1878, more contractors did speculatively buy and redevelop plots of land in this area,[54] the vast majority of building artisans who lived there before that redevelopment had very little means, and they were just as susceptible as the working classes to the neighbourhood's renewal and gentrification.

An emerging suburban cluster: around Rue Van Aa in Ixelles

By 1932, all clusters of construction entrepreneurs in the city centre had disappeared. Many had had to make way, but encountered a favourable alternative spatial context in the suburbs. It suggests dynamics of small-scale industrial suburbanization since at least the second half of the nineteenth century, confirming Lewis' findings on both the timing and the scope of industrial suburbanization in North America.[55] He argued that the formation of manufacturing suburbs was not limited to large-scale capital-intensive industries that were able to take advantage of ample cheap suburban land. Instead, it involved firms of all sizes, including small labour-intensive firms, and from a range of industries: food, clothing, metal and printing. Space demands and locational mobility varied from industry to industry, however, resulting in a variation in the ability of industries to settle on the urban fringe.[56]

In construction, the particular dynamics were quite unique. The low capital and low spatial needs of construction businesses resulted in a limited fixed-capital inertia and made them highly locationally mobile. Many were attracted by the aforementioned pull factor of a high construction activity on the urban fringe. But instead of evenly dispersing into the suburbs, builders clustered there as well, especially in the eastern suburbs where the proximity of a wealthy clientele offered many profitable market opportunities. While it shows that clustering was, also in construction, not necessarily an outdated mode of spatial organization, builders were not so much attracted to the typical industrial suburbs with their large greenfield sites near

[52]G. Crossick, 'The petite bourgeoisie in nineteenth-century Britain: the urban and liberal case', in G. Crossick and H.-G. Haupt (eds.), *Shopkeepers and Master Artisans in Nineteenth-Century Europe* (London, 1984), 82–3.

[53]Dyos, 'The speculative builders and developers'; Abrahamse *et al.*, 'Gouden kansen?', 229–57.

[54]Y. Leblicq, 'Evolutie van het uitzicht van Brussel in de 19de eeuw', in *Brussel, breken, bouwen. Architectuur en stadsverfraaiing 1780–1914. Tentoonstellingscatalogus* (Brussels, 1979), 64–6.

[55]Lewis, 'Industry and the suburbs'.

[56]Lewis, *Manufacturing Montreal*, 1–22.

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Figure 5. Clusters of construction enterprises in 1866, 1899 and 1932 on height model of the Maelbeek valley (Data: BCA almanacs and patent registers, Background: Digitaal Hoogtemodel Vlaanderen II).

working-class housing districts and transportation facilities, such as on the western canal axis in Brussels. A stronger locational pull was instead exerted by the growing bourgeois demand for housing on the eastern side of the city, where clusters are visible from 1866 on in, again, fairly cheap and densely built areas with a mixed residential–industrial fabric.

For the dissolving Notre-Dame-aux-Neiges cluster, we verified to where builders were displaced through an analysis of their municipalities of destination, as recorded in the population registers of the city of Brussels that contain all inhabitants per address.[57] For the aforementioned two streets at the core of this cluster, we traced 133 builders – regardless of their status as entrepreneurs or wage labourers – who left the area between 1871 and 1876, and for whom a municipality of destination was recorded. The largest group (37 per cent) relocated to the nearby, cheap and densely built north-eastern suburb of Saint-Josse, where a new cluster had emerged by 1899. A further 48 per cent relocated to a variety of other municipalities in the Brussels urban agglomeration. Among them was Sébastien Debue, a 30-year-old bricklayer-labourer who moved in 1876 from Rue Notre-Dame-aux-Neiges to Rue du Collège in the south-eastern suburb of Ixelles. There, he settled as a self-employed plasterer in a fully developing area, in the midst of a densely built lower-middle-class neighbourhood that was becoming the most important cluster of construction entrepreneurs in the city.

In 1866, this cluster was first visible around Rue Van Aa, then situated at the urban fringe. At that time, it still formed the only cluster outside the city centre. Figure 5

[57]BCA, *Recensements de population*, 1866.

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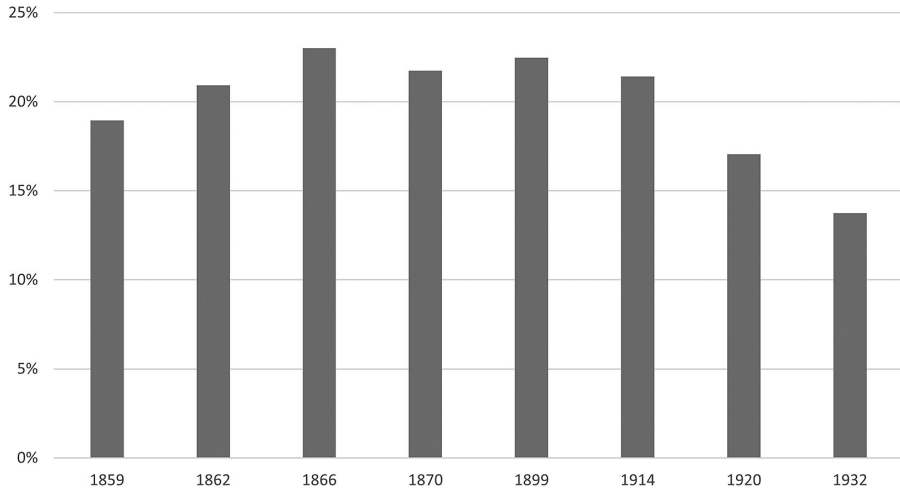

Figure 6. Share of buildings used by construction enterprises in the four building blocks around Rue Van Aa (Data: BCA almanacs).

situates the concentrations of over 500 firms per km² in this area for 1866, 1899 and 1932 on a present-day height model of the city. It shows the influence of the slope and course of the (vaulted) Maelbeek river valley, where plots were laid out on a difficult terrain with sharp inclinations or on low grounds with high flood risks. Displeasing the wealthy bourgeoisie, this left ample cheap space available for small-scale industrial activities.[58]

Figure 5 also shows the long-term persistence of a high density of construction enterprises in and around four building blocks surrounding Rue Van Aa between 1866 and 1932. The construction of most of these streets was planned by the municipality in 1844.[59] The north-western block was initially conceived as a workers' housing block, the *Cité Gomand*, the first of such initiatives in Belgium that was subsidized by the state in 1849. The next year, however, proprietor Louis Gomand reclaimed control over the rent prices of the houses. It is telling for their modest social status that these houses, intended to accommodate workers, were subsequently inhabited by only slightly more capitalized building artisans.[60] Moreover, between 1850 and 1890, an abattoir at the end of Rue Van Aa caused a lot of nuisances and further drove the more affluent middle classes out of the neighbourhood.[61]

Figure 6 shows the evolution of the proportion of construction entrepreneurs listed on these four blocks in the city's almanacs. We added a few sample years to

[58]F. Vandyck, 'Built to construct: learning from the architecture of construction workplaces in the Brussels-Capital Region', Vrije Universiteit Brussel Ph.D. thesis, 2020, 182–4, 224–34.

[59]*Plan d'ensemble des Rues du Collège, Sans-Souci, de la Tulipe, de Venise et du Viaduc* (Royal Decree of 04/11/1844); Brussels Hoofdstedelijk Gewest, Inventaris van het Bouwkundig Erfgoed, 'Van Aastraat', in: https://monument.heritage.brussels/nl/Elsene/Van_Aastraat/10502940.

[60]ArchivIris, 'Een mislukte proef: de arbeiderscité van Louis Gomand', in: https://archiviris.be/fr/2019/01/27/un-essai-manque-la-cite-ouvriere-de-louis-gomand-een-mislukte-proef-de-arbeiderscite-van-louis-gomand/.

[61]M. De Beule, *Brussel. Geplande geschiedenis. Stedenbouw in de 19e en 20e eeuw* (Sprimont, 2017), 76, 79; Brussels Hoofdstedelijk Gewest, Inventaris van het Bouwkundig Erfgoed, 'Voormalig gemeentelijk slachthuis', in: https://monument.heritage.brussels/nl/Elsene/Jean_Van_Volsemstraat/71/19922.

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point out the continuities or changes in between. By 1859, when the area had been developing for only 10 years, construction enterprises already occupied nearly 20 per cent of all listed buildings. It confirms observations of builders settling as pioneers in developing neighbourhoods, close to the high demand for their work on the many construction sites nearby.[62] In the late nineteenth century, they remained constant at 22 to 23 per cent. By 1899, the cluster was reinforced and had expanded around Rue Van Aa, where it formed the strongest concentration of construction enterprises in the entire city, still situated close to a great deal of developing areas for the urban bourgeoisie.[63] The proportion remained above 20 per cent until 1914. In the early twentieth century, the cluster expanded south into the Maelbeek valley, where it followed the course of this vaulted river through low-lying, relatively cheap streets where a mixed residential–industrial fabric developed.[64]

Whilst a high density of over 500 firms per km² can still be observed on these blocks in 1932, the proportion of construction enterprises had already started to decline during and after World War I. In this evolution, we observe the start of a twentieth-century process in which both the absolute and relative presence of construction enterprises in the city declined. For this neighbourhood in particular, the growing distance from the advancing urban fringe reduced the assets of its location as a favourable operating base. Next to market economic dynamics that caused the number of construction artisans to generally decline,[65] dynamics in urban planning and the real estate market continued to play a role. The upcoming ideal to separate living from working ensured that few suburban areas with a mixed residential–industrial fabric were newly developed from the inter-war period.[66] At the same time, ongoing surges in real estate prices intensified the disappearance of construction enterprises from the city centre through rising rents and the increasing profits to be made from converting (semi-)industrial buildings to exclusively residential ones.[67] Because these gentrification dynamics are today also at hand in the densely built suburban neighbourhoods, the continued presence of construction enterprises in the city as a whole is increasingly at stake.[68] To tackle this contemporary issue, however, it is worthwhile to adopt a long-term historical perspective. The disappearance of small-scale artisans from the cityscape has presented itself here as a process stretching back to the late nineteenth century, when planning policies for the redevelopment of inner-city areas had already provoked extensive displacements.

Conclusion

The analysis of construction enterprises' locational patterns in Brussels between *c.* 1830 and 1930 confirms earlier observed patterns of a broad scattering of artisans

[62]Vandyck, 'Built to construct', 184; Abrahamse *et al.*, 'Gouden Kansen?', 244.

[63]Vandyck, 'Built to construct', 182; V. Pouillard, C. Deligne and C. Vandermotten, 'Elsene', in S. Jaumain (ed.), *Het Brussels Hoofdstedelijk Gewest* (Tielt, 2008), 210.

[64]Vandyck, 'Built to construct', 205–35; M. Culot (ed.), *Inventaire visuel de l'architecture industrielle à Bruxelles* (Brussels, 1980).

[65]Degraeve, 'Building Brussels', 120–9.

[66]Vandyck, 'Built to construct'.

[67]Degraeve, 'Building Brussels', 378–81.

[68]S. De Boeck, M. Degraeve and F. Vandyck, 'Maintaining small-scale production space in the city: the case of Brussels construction companies (1965–2016)', *Brussels Studies*, 147 (2020).

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throughout the urban space, similar to shopkeepers of convenience goods, which enabled them to cater for building and renovation needs in their own neighbourhood. Amidst this pattern of dispersal, however, there were also striking clusters of construction entrepreneurs which featured patterns of industrial suburbanization, much like Lewis concluded for North American cities. Especially in cheap, densely built and mixed residential–industrial neighbourhoods, situated close to a wealthy clientele, construction entrepreneurs encountered the most favourable conditions to operate their business.

At the same time, the analysis also revealed the precariousness of their local embeddedness in these areas. The importance of clustering decreased over time, both through pull factors of a high construction activity on the urban fringe, and through push factors of the redevelopment, upgrading and gentrification of their inner-city neighbourhoods: an evolution that occurred repeatedly in Brussels' densely built city centre, and to which builders as small-scale artisans were particularly susceptible. Planning policies for the renewal of urban infrastructure and the resulting dynamics on the real estate market thus came forward as the first drivers of urban de-industrialization, affecting the displacement of small-scale artisans from inner cities since at least the late nineteenth century.

It is through such findings that we have only recently started to comprehend how the vast urban growth and industrialization of the nineteenth and twentieth centuries impacted those who catered for the essential needs of urban dwellers, how they operated and adapted to a city in transformation, and which place they could claim within a developing urban space. By means of GIS mapping methods, major progress has recently been made on the changing locational patterns of urban shopkeepers. This article has aimed to shed a similar new light on the long-term locational patterns of small-scale urban artisans, nuancing the long accepted general picture of their strong and increasing dispersion across the city, as the least segregated of any occupational groups. A focus on entrepreneurs in the construction sector in Brussels between *c.* 1830 and 1930 allowed us to take a heterogeneous group of mostly small-scale artisans into account, who kept working in labour-intensive ways, in a rapidly growing city where the need for their work did not cease to exist.

Yet, the main contribution of this GIS-based analysis does not merely lie in the description of changing locational patterns based on a large sample of data, but rather in its capacity to confront these patterns with other spatial dynamics; that is, of real estate prices, planning policies, urban renewal and gentrification, and interpret their importance as driving forces behind the observed spatial shifts. By confronting different spatial datasets with variables on potential underlying causes, future GIS-based analysis will allow historians to further explore the causal and chronological dynamics behind important urban evolutions, such as the displacement of manufacturing from inner-city areas, but also expand the scope towards different cities, to various urban groups and to other long-term dynamics of urban transformation.

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