

The Evolution of Coworking Spaces in Milan and Prague: Spatial Patterns, Diffusion, and Urban Change



Pavel Bednář, Ilaria Mariotti, Federica Rossi, and Lukáš Danko

Abstract During the last two decades, the labour market of the advanced economies has changed, with the increased use of short-term contracts and higher flexibility in terms of working spaces and work organization. Due to ongoing processes of the globalization and the Industry 4.0 Revolution, distance, location, and time are often no longer considered necessary conditions to make business. In this context, we have witnessed the development and diffusion of coworking spaces (hereinafter CSs). This chapter aims to investigate and compare development, typology, and dynamics of spatial distribution of CSs in two alpha global cities, Prague and Milan, between 2015 and 2019. Using two original geo-referenced databases, the chapter firstly proposes two metrics for quantitative mapping of CSs within basic settlement units in Prague and local identity units in Milan. Local spatial autocorrelation is used to identify spatial clusters in given years, and local spatio-temporal analysis investigated by differential spatial autocorrelation is applied to identify whether changes in spatial patterns over time are spatially clustered. Based on these findings, the chapter highlights similarities and differences in spatial patterns, spatial diffusion, and evolution of CSs in the two cities. Secondly, the chapter provides a discussion on micro-location of CSs in relation to the internal urban spatial structure and its transformation (urban core commercialization, inner city urban regeneration, and gentrification) and thereby the transition to the polycentric city model.

Keywords Cluster · Coworking spaces · Spatial patterns · Urban change

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Introduction

During the last two decades, the labour market of the advanced economies has changed, with the increased use of short-term contracts and higher flexibility in terms of working spaces and work organization. The ICTs, indeed, have fostered the flexibility and hybridization of workplaces, which now include private homes but also unusual places like libraries, cafes, restaurants, airport lounges, etc. (the so-called third places, Oldenburg 1989).

Within this context, we have witnessed the development and diffusion of new working spaces like coworking spaces (hereinafter CSs), which try to answer to the self-employed and freelance workers' needs of social and professional interaction by increasing meeting opportunities and therefore reducing the risks of isolation (Johns and Gratton 2013; Moriset 2014). Indeed, as underlined by Spinuzzi (2012) and Parrino (2015), relational and geographical proximity within CSs may foster information exchange and business opportunities, creating a collaborative community.

The present chapter aims to investigate and compare the development, typologies, and dynamics of the spatial distribution of CSs in two alpha global cities, Prague and Milan.

In Italy, CSs are mainly concentrated in regions with large urban areas (i.e. Lombardy, Veneto, Emilia Romagna, Lazio, Tuscany, and Piedmont), and about 50% are located in Italian metropolitan cities as Milan (99), Rome (50), Turin (23), and Florence (17). Similarly, in the Czech Republic the three major urban agglomerations (Prague, Brno, and Ostrava) host 50% of all CSs. Nevertheless, we have witnessed to a rapid growth of CSs in Czech and Italian medium-sized cities and peripheral areas (Vlach 2020 for Czech; Mariotti et al. 2020 for Italy), following a pattern of hierarchical spatial diffusion.

Milan is the Italian city hosting the majority of CSs; it is located in the northwest of Italy, it is the capital city of Lombardy region and represents the core of the national knowledge-based, creative, digital, and sharing economy, and it is the main financial and economic hub of the country (Mariotti 2018). Milan's GDP is 22% of the country's total, and it is almost double the average Italian GDP per capita (49,000 EUR in Milan and 26,000 EUR Italian average), while its population is 17%. Besides, the city shows a leadership in terms of patents (32%) and scientific research (27%). Specifically, Milan is the favourable location of inward foreign direct investments (FDIs).

Prague is the capital of the Czech Republic having similar population to Milan within its city limits (1,3 million). The population size of its metropolitan area is comparable to Milan as well (3 million), however, with remarkable less population density. Prague is responsible for 25% of GDP of the Czech Republic although its share on the country population reaches 12% only. Prague's GDP per capita in PPP (56,200 EUR) makes the city the seventh richest region in the EU 28 as a percentage (187%) to the EU average (Mayerhoffer 2020). Due to presence of almost all national authorities of the public sector administration, headquarters of the largest

domestic corporations and conglomerates by revenues, and institutes of the Czech Academy of Sciences, Prague is considered as one of the primary business and innovation centres in Central Eastern Europe along with Warsaw and Budapest. Such condition attracts both domestic and foreign direct investment in knowledge-intensive business services (KIBS) resulting in 75% employment in service sector and the lowest unemployment among the EU 28 regions before the COVID-19 pandemic having been below 2% in the last several years (Mayerhoffer 2020).

The first CS in Milan was opened in 2006, while it is only after 2012 that the city has witnessed to the “boom years”, pushed by bottom-up initiatives, both profit and non-profit. As underlined by Mariotti et al. (2017), there are three city’s characteristics fostering the spread of CSs: (1) the crucial role of private actors, higher education, cultural institutions, and local authorities in implementing urban agenda; (2) the increase in the demand and supply of economic and social innovation, in particular, the city council assigned public abandoned spaces to private initiatives in order to develop innovative working places, providing economic subsidies for CSs; and (3) after the economic crisis of 2008, the city has enhanced its high levels of entrepreneurship and social cooperation, integrating them with both ICT innovations and the sharing economy growth.

Instead, Prague shows a time delay in the development of CSs: the first was founded in 2009, and an intensive increase in their number begins in 2015. This delay stems from the hierarchical diffusion of innovations, as Prague lies outside Europe’s main economic axis – the so-called Blue Banana. As Mayerhoffer (2020) suggests, Prague currently undergoes the internationalization of CS activities which is a result of the entry of the international/global CS providers who implement their activities into the new property-led office development projects in the centre and the inner city. This is reflected in the spontaneous spatial dissemination of CSs encouraged by the neoliberal environment of the city’s public policy. The city has not yet intervened in this process, and everything is left in the hands of the market.

By using two original geo-referenced databases, the chapter offers a twofold empirical contribution: (1) a time-space quantitative mapping of CSs within basic settlement units in Prague and local identity units in Milan, applying research design used by both Feng et al. (2016), and Grekousis and Gialis (2019), i.e. combination of local spatial autocorrelation and local differential spatial autocorrelation techniques in order to identify spatial clusters in given years and spatial cluster of changes in spatial patterns over time, respectively, and (2) a discussion on micro-location of CS in relation to the internal urban spatial structure and its transformation (urban core commercialization, inner city urban regeneration, and gentrification) and thereby the transition to the polycentric city model.

The chapter is structured into five sections. The introduction is followed by a literature review focusing on CSs and their location patterns. Section “**Data and methods**” describes data, and section “**Results**” presents the empirical analysis and the results. Concluding remarks and further research follow.

Literature Review

The provision of a physical space with desks, technological equipment (Wi-Fi), meeting rooms, and other services for users (i.e. kitchen, relax area) is just one component defining a CS. Indeed, the crucial characteristics of this type of spaces are the establishment of a community and the practice of “working alone together”, which implies both a shared working environment and the performance of independent activities (Bilandzic 2016; Capdevila 2014).

In addition to the intangible concept of community, Fuzi et al. (2014) identified the following CS values: the willingness to collaborate and cooperate with the other coworkers, the sustainability issues, the openness which allows to share ideas, and the accessibility, declined both in a financial meaning and in a physical one. As underlined by Moriset (2014, p. 7), a CS should be first “an atmosphere, a spirit, and even a lifestyle”.

Therefore, by integrating knowledge, creative, and digital workers (Moriset 2014) with geographical proximity and non-hierarchical relationships, CSs may generate socialization – CS as a “relational milieu” (Gandini 2015, p. 200) – and, consequently, business opportunities (Spinuzzi 2012).

The phenomenon of CSs was the subject of academic papers across several disciplines: sociology, anthropology, geography, planning, business and management, and economics.

Since the aim of the chapter is to identify spatial clusters within the cities of Milan and Prague, and possible changes in spatial patterns over time, we give special attention to the literature on the location factors of service firms belonging to creative industries. Indeed, as found by Akhavan et al. (2019), CSs mainly (74% of CSs in Italy) belong to these sectors.

There is a robust empirical evidence that creative industries geographically concentrate in metropolitan areas, around medium-sized and large cities, and in cross-border areas (among others, see Cruz and Teixeira 2014; Boix et al. 2015). In particular, Lazzarretti et al. (2012) found that the historical and cultural endowments, the average size of creative industries, the size of the place, the productive diversity (Jacobs knowledge spillover), and the concentration of human capital and creative class (Clifton and Cooke 2007) are the factors boosting the concentration of creative firms and creative employment in Italy and Spain. In addition to these factors, creative industries prefer locations with good access to clients, specialized labour and firms, universities, good transport accessibility (airports, freeways, train stations), as well as the presence of urban amenities, such as restaurants, cafes, shops, and cultural and entertainment services (e.g. theatres, museums, cinemas, etc.) (Sivitanidou 1999; Van Oort et al. 2003; Curran et al. 2016).

Specifically looking at the location patterns of CS in large cities, Moriset (2014) found that, in 2014, CSs are mainly concentrated within the so-called creative cities of advanced economies (i.e. San Francisco, London, Paris, Berlin, Amsterdam, Barcelona, and New York). Looking at the location of CS in the Netherlands, Stam and van de Vrande (2017) found that most of them are in large cities, with good

accessibility, and sometimes within (temporarily) abandoned areas. Moreover, they underlined the positive role of CSs proximity to coworkers' homes (i.e. most of coworkers (55%) travel by bike (73%) or walk (12%) to coworking locations) in reducing the pressure of inner city traffic. Mariotti et al. (2017) explored the case study of CSs in the city of Milan, highlighting similarities in the location patterns of CSs and service firms in urban areas. Specifically, they found that CSs prefer locations with high density of business activities, which are close to universities, research centres, and to the local public transport network.

Therefore, cities can be seen as the cradle of innovation, where colocation of firms (including CSs), which belong to both the same sector and different ones, could exploit the cross-fertilizing ideas through formal and informal exchange of information (Caragliu et al. 2016; Van Winden and Carvalho 2016).

Data and Methods

To compare the spatio-temporal patterns of localization and concentration of CSs in both cities, sources of primary and secondary data on the specified variables have been found. In case of Milan, data on CSs have been provided by Mariotti and Akhavan (2020a) who updated the CS database developed by Mariotti et al. (2017), through desk research and direct contacts with CS managers. In the Czech Republic, it was used as the most complete freely accessible and periodically updated database covering the entire territory of the country (Vlach 2020), and it was complemented with Mayerhoffer (2020) by selecting CS development projects of international/global CS providers that took place in the territory of Prague in 2019. The authors verified the data and added information – coming either from the websites or from interviewing the CS managers – on the creation, characteristics of the urban spaces, and the activities of the CSs.

Based on comparison of the databases and the results of previous research, the years 2015 and 2019 were selected in order to compare temporal development of CSs. The location data on CSs was transferred to point geo-reference databases (one for each city). These were subsequently aggregated by spatial join into administrative territories – Nuclei di Identità Locale (local identity units – NIL) for the city of Milan and basic statistical units (BSU) for the city of Prague.

Based on the results of spatial autocorrelation and for the purpose of describing the outcomes, city districts with positive spatial autocorrelation were delimited within NIL and BSU as significant local spatial clusters of CSs. Before the analysis of spatial autocorrelation, which is a tool for detecting the concentration of clusters or spatial-temporal development of CSs clusters, it was necessary to define spatial weights to determine the spatial links of the relevant administrative unit to the neighbouring units. The results of the spatial distribution of CSs in Milan according to Mariotti et al. (2017) and Mariotti and Akhavan (2020a) were used to define the weights as well as the principles of concentration of creative industries (Sivitanidou 1999; Van Oort et al. 2003; Curran et al. 2016) and knowledge-intensive business

services settled in areas with a high density of business activities according to the assumptions of localization and urbanization economy.

On this basis, the method of first-order queen contiguity spatial matrix was selected in which polygons of the given administrative units share an edge and/or a corner. Two specific methods of local spatial autocorrelation were used for the analysis of spatial patterns. The first one was used to identify spatial clusters in given years (LISA – Anselin 1995); in the second, local spatial-temporal autocorrelation statistics (differential LISA – Grekousis 2018) was applied to identify whether changes in spatial patterns over time are spatially clustered. In accordance with Grekousis (2018) the logic of spatial autocorrelation is that it measures how much the value of a variable in a specific polygon (here administrative unit) is related to the values of the same variable at its neighbouring polygons. When the nearby administrative units have similar values as the observed administrative unit, there is an indication of a positive spatial autocorrelation existence. If the nearby neighbouring administrative unit shows significantly different values relative to the given administrative unit, then a negative spatial autocorrelation exists. Local indicators of spatial association are used for the detection of significant local spatial clusters in case of positive spatial autocorrelation, as well as for diagnostics of local instability, significant outliers, and spatial regimes in case of negative spatial autocorrelation (de Dominicis et al. 2011, p. 13).

Results

Data about CSs in Milan and Prague are shown in Table 1, where a total of 140 active CSs are in both cities at the end of the year 2019. Their distribution before 2015 and in 2015–2019 suggests similar shares. In both cases, the CSs have grown in the second period, when the share is approximately two thirds of the total current number of CSs in both cities. This also corresponds to the world trends (see, namely Avdikos and Iliopoulou 2019, and Mayerhoffer 2020). The database also suggests existence of a time delay in development of CSs in Prague if compared to Milan. The first CS in Prague was established in 2009 (Mayerhoffer 2020), whereas the same happened in 2006 in Milan (Mariotti et al. 2017). This is related to the

Table 1 Development of currently active coworking spaces in Milan and Prague in the selected periods of time

Time period	City			
	Milan		Prague	
	Frequency	Percent	Frequency	Percent
Before 2015	38	38.4	14	34.1
After 2015	61	61.6	27	65.9
Total (2019)	99	100.0	41	100.0

Source: Authors' data compilation based on Vlach (2020), Mariotti and Akhavan (2020a), and Mariotti et al. (2017)

traditional West-East gradient of spatial diffusion of innovations, given by the post-communist transformation of Prague (Sýkora and Bouzarovski 2011) and by the different position of both cities within the ranks of global cities: Milan occupies alpha level, whereas Prague is recognized as alpha-level city (Loughborough University 2018a). Although both cities represent the economic cores of their respective countries, Prague is a business centre of the Visegrad Group countries (Poland, Czechia, Slovakia, and Hungary), whereas Milan has more intensive ties to global alpha++ and alpha+ cities (Loughborough University 2018b) thanks to its position as one of the global clothing centres since the 1970s (Merlo and Polese 2006).

The Evolution of Coworking Spaces in Milan

The 99 CSs located in Milan represent 18% of CSs in Italy, since at January 2018 the country was hosting 549 CSs (Akhavan et al. 2019). This confirms the high attractiveness of the global city, which also hosts some international/global providers of CSs. As it happens in Italy, CSs in Milan are mainly bottom-up initiatives established by private and non-profit entities and member of the creative class. The majority of bottom-up CSs belong to “Rete COWO”, which is a CS network offering consulting services to CS managers, and even the director of Rete COWO manages his own CS.

The CSs tend to be specialized in one prevailing sector or industry: architecture and design (18%, in Tortona Navigli neighbourhood), digital (10%), communication and information technology (8% each, in Isola-Sarpi), and social innovation (5%). Besides the largest CSs prefer peripheral areas due to the availability of premises (previous industrial buildings) at lower prices; vice versa the smallest are settled in central areas because they used to be traditional offices that have been transformed into CSs (Parrino 2015; Mariotti et al. 2017).

An interesting issue characterizing Milan are the policy measures promoted by the municipality favouring CSs through vouchers assigned to coworkers to pay the rent of the desk and by the city council which assigned public abandoned spaces to private initiatives in order to develop innovative working places. Since 2013, the Milan municipality has started to provide economic incentives to young coworkers, who want to promote innovative business activities located within CSs. In 2013, the first public tender received 223 applications: 152 coworkers were financially supported for a total amount of 134,608 EUR. In 2015 there was a second tender addressed both to coworkers and CSs, where 65 coworkers applied and 49 were funded having received 69,567 EUR, while 25 CSs applied and 22 were financed in amount of 280,633 EUR. In particular, the latter received a maximum of 20,000 EUR each, as long as they privately invested in the CS the same amount received by the municipality (according to the rule 1 EUR from the public sector equals 1 EUR from the private sector).

In 2017, thanks to the last tender, 23 CSs were financially supported (35 applications received), for a total amount of 296,000 EUR. The municipality provided a

maximum of 20,000 EUR for the creation of new CSs, and a maximum of 10,000 EUR for already active spaces, giving priority to those located in peripheral zones of the city.

Moreover, the Milan municipality fostered the creation of a qualified register of CSs located in the city. In order to be registered, the CS has to comply with some quality requirements: having a minimum of ten workstations, Wi-Fi connection, some common areas, some services equipment, a website, being in compliance with regulations, being accessible for disabled people, and carrying out cultural and training activities. Finally, also the Lombardy region implements some policies addressed to CSs, such as vouchers for spaces and coworkers.

Coworking Spaces in Milan: Spatial Patterns, Diffusion, and Urban Change¹

The spatial dimension of the evolution of CSs in Milan before 2015 was analysed using the local indicator of spatial autocorrelation (LISA). In Milan, CSs are more willing to be in areas characterized by (1) high intensity built-up areas and business activities, (2) good transport accessibility, and (3) existence of agglomeration and urbanization economies. The analysis has been run at the NILs (local identity units) level, that are, the 88 local units, which compose the municipality area according to the services plan (Piano dei Servizi) of the Piano di Governo del Territorio (PGT) as of 2020.

The results of Local Moran's I of spatial distribution of CSs in Milan, before 2015, are depicted in Fig. 1, which highlights significant local spatial clusters of high-high values within the NILs on the right side of the city centre (A: Brera, Porta Garibaldi, and Porta Nuova) and within the northeastern area (B: Buenos Aires, Casoretto, Città Studi, Loreto, Nolo, Porta Monforte, and Porta Venezia; C: Cimiano, Q.re Feltre, and Rottolo). While the majority of CSs located in the central area (A), and specifically in Duomo, tend to be smaller and more "office-like" (Mariotti et al. 2017), the more we move further from the centre, the higher is the chance to find larger CSs in previous industrial sites, as in the case of C cluster. Generally, the majority of CSs are in the higher-density NILs, with functional mix, universities and research centres, and good accessibility to local public transport. The location is explained by the fact that localization and urbanization economies, market size and the "productive amenities" (good access to customers, skilled human resources availability, specialized services, universities, research centres, transport accessibility), and "not productive amenities" – bars and restaurants, shops, cultural and entertainment activities, and good urban quality (Florida 2012; Van Oort et al.

¹The analysis about the location of CSs in Milan and its change in 2015–2018 differs from the one developed by Mariotti and Akhavan (2020a) since the present is run through Local Moran's I, while the other concerns the change rate of CSs and their location.

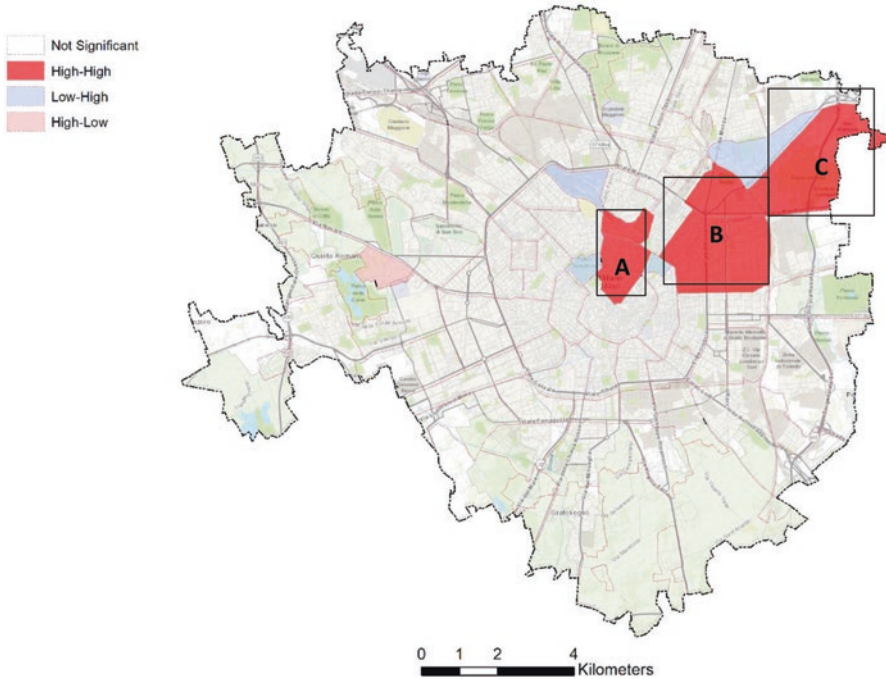


Fig. 1 Local Moran's I scatterplot map for coworking spaces in Milan NIL established prior to 2015

Source: Authors' development based on Mariotti and Akhavan (2020a) and Mariotti et al. (2017); base map City of Milan (2020)

Note: Local identity units (NIL) A = Brera, Porta Garibaldi, Porta Nuova; B = Buenos Aires, Casoretto, Città Studi, Loreto, Nolo, Porta Monforte, Porta Venezia; C = Cimiano, Q.re Feltre, Rottolo

2003) – are the drivers of the attractiveness of the NIL. The largest and more hybrid CSs host services for coworkers (meeting rooms, kitchen, relax areas, or gardens) and for people outside (café, restaurants, rooms for exhibitions, and events). Besides, they tend to be more located at the ground floor of buildings with windows by the streets so to be more visible and integrated with the neighbourhood.

The spatial distribution analysis of the CSs located in Milan after 2015 (Fig. 2) shows a change of the clusters with high-high values: in addition to the NILs of Fig. 1, CSs were also spatially clustered within the surrounding areas (B: Isola, Farini; C: Ponte Seveso, Stazione Centrale; D: Guastalla, XXII Marzo). This spatial pattern might be related to the new urban development project of Garibaldi-Repubblica where the “Bosco Verticale” skyscraper is located,² which hosts UniCredit bank headquarter. This area has attracted several foreign and national

²The Vertical Forest, designed by Boeri Studio, was inaugurated in October 2014 in Milan in the Porta Nuova Isola area, as part of a wider renovation project.

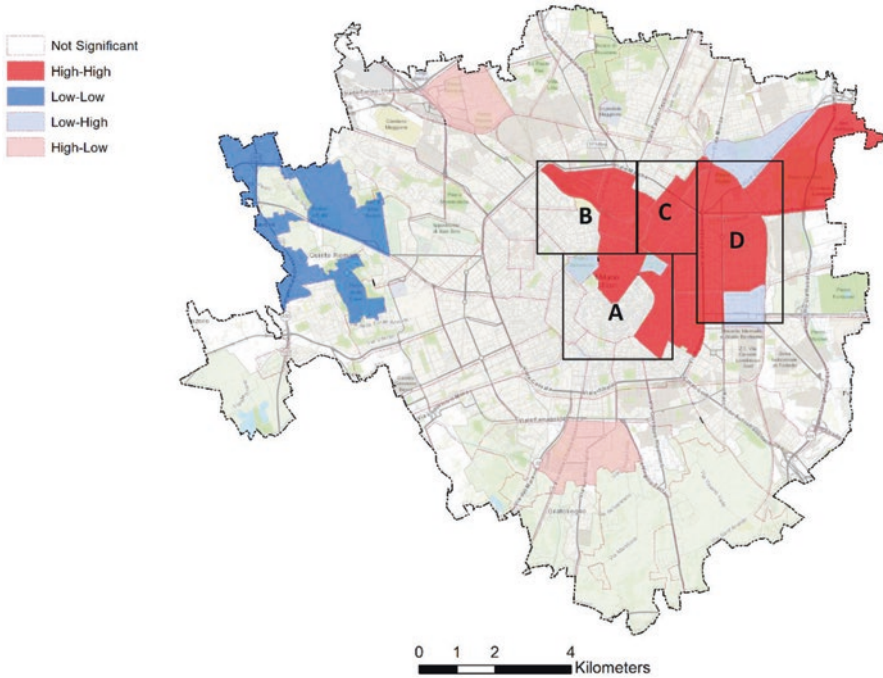


Fig. 2 Local Moran's I scatterplot map for coworking spaces in Milan NIL established in and post 2015

Source: Authors' development based on Mariotti and Akhavan (2020a) and Mariotti et al. (2017); base map City of Milan (2020)

Note: Local identity units (NIL) A = Brera, Porta Garibaldi, Porta Nuova; B = Isola, Farini; C = Ponte Seveso, Stazione Centrale; D = Guastalla, XXII Marzo

MNEs like Google, Samsung, and Microsoft that have settled there (Mariotti 2018). Besides, even the central railway station area has been regenerated, and Copernico company rented three buildings in the area supplying office spaces as well as CSs. The area has, indeed, the best accessibility level of the city. Another interesting area is Isola-Farini, which borders Garibaldi-Repubblica and has experienced a gentrification process starting from the mid-1990s and attracts creative, young, and medium-high income class. Similarly, the NIL of XX Marzo is close to the new development area at the south of Porta Romana where Prada Foundation and the Symbiosis technological Business District have been recently located.

Figure 3 shows the statistically significant changes of CSs over time in each NIL, which are related to that of its neighbouring NILs. The first positive spatial-temporal autocorrelation variation (high-high values) concerns the historical core (A: Duomo), the B (Dergano) and C clusters (Ponte Seveso, Stazione Centrale). Both cases referred to a NIL where the number of CSs change in 2015–2019 period is statistically related to that of its neighbouring NILs. This confirms the highest CS growth dynamics in the historical core and the Central Station area in 2015–2019,

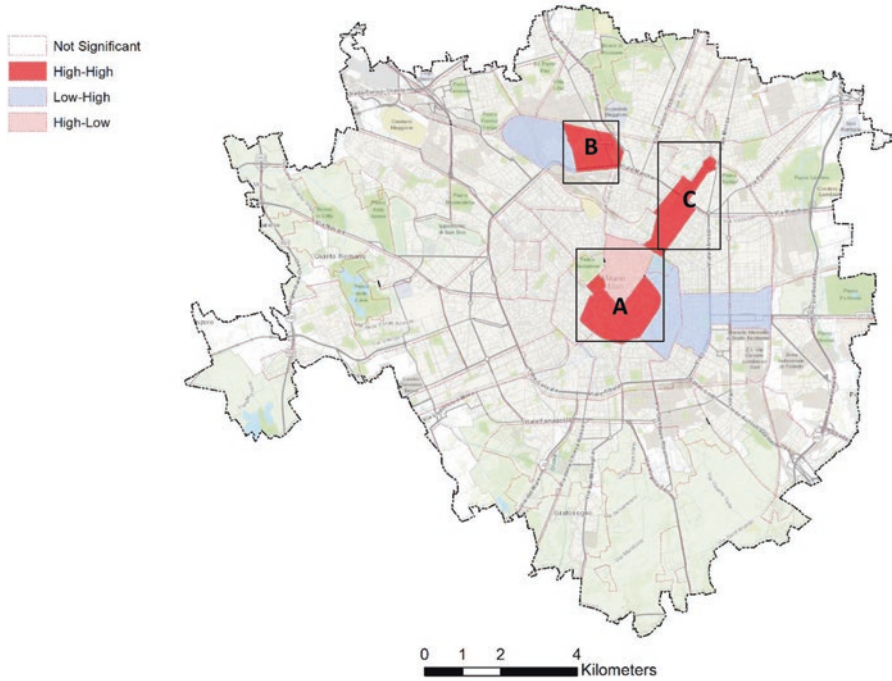


Fig. 3 Differential local Moran’s I scatterplot map for coworking spaces in Milan NIL 2014–2019
 Source: Authors’ development based on Mariotti and Akhavan (2020a) and Mariotti et al. (2017);
 base map City of Milan (2020)
 Note: Local identity units (NIL) A = Duomo, B = Dergano; C = Ponte Seveso, Stazione Centrale

which, as already described, became an attractive place in the last 5–10 years. Besides, Dergano NIL became more attractive after 2015, and this can be related to three factors: (1) proximity to Isola and Garibaldi Repubblica; (2) lower real estate prices, on average; and (3) proximity to the newly announced large urban transformation project of “Scalo Farini” (Farini railyard).

The Evolution of Coworking Spaces in Prague

The 41 CSs in Prague represent 36.9% of CSs in the Czech Republic (Vlach 2020). This confirms the dominance of Prague as the economic centre of the country and which is further strengthened by the presence of several international/global providers of CSs (see Mayerhoffer 2020, Table 1) giving Prague precedence over two other most populous cities (Brno and Ostrava) where only one global CS provider, Hub Ventures (ImpactHub), operates.

Considering the CS taxonomy, the first phase is characterized by a prevalence of CSs focused on supporting female entrepreneurship and social entrepreneurship

and community development. These CSs were established by both private and non-profit entities and member of the creative class, respectively. Some of them were supported by partnering companies, thus promoting the development of entrepreneurial activities in low level and low flexibility rent communities. The objectives of these CSs differ, including support to female entrepreneurship by providing baby-sitting services, support to practising English among domestic users and digital nomads from abroad, and support to individuals, freelancers, and start-ups by providing opportunities for consultations, range of workshops, and community events. Using the CS taxonomy, according to Bouncken et al. (2018, p. 401), these are independent CSs with social entrepreneurship combining economic returns and supporting social causes. For the reasons listed above, the taxonomic definition for these CSs is community-oriented CSs instead of community-led CSs, which are mostly based on non-profit ventures as defined by Avdikos and Iliopoulou (2019). On the contrary, the post-2015 period is characterized by dynamic development of business-oriented CSs (Bouncken et al. 2018, p. 401), which Avdikos and Iliopoulou (2019) also call entrepreneurial-led CSs. These are oriented exclusively on economic return. The development and the transformation of the business model are accompanied by the internationalization of providers' activities. The providers of CSs invest into renting vast areas for shared business activities, as indicated above. In other cases, some CSs start to specialize with a focus on selected (KIBS), creative industries and high-technology (high-tech) CS. These changes increase cognitive proximity (Boschma 2005, p. 65) and implicit knowledge within projects collaboration while competing for the same resources and the same client (Bouncken et al. 2018, p. 402).

Coworking Spaces in Prague: Spatial Patterns, Diffusion, and Urban Change

As for Milan, the spatial dimension of the evolution of CSs located in Prague before 2015 was analysed using the LISA. In Prague, the CSs are more willing to be located in areas characterized by (A) high intensity built-up areas and business activities, (B) good transport accessibility, and (C) existence of agglomeration and urbanization economies. Accordingly, the VSU of Prague were divided because of the morphogenetic zones in terms of urban fabric according to prevailing construction period and housing types. Subsequently, the morphogenetic zones of Prague were classified according to (1) the housing types defined by Špačková et al. (2016, p. 833) – (A) historical core, (B) tenement houses, (C) villa neighbourhood, (D) working-class houses, (E) housing estates, (F) suburban periphery – and (2) distinction of inner city zone by Kährlik et al. (2015), which includes housing types B, C, and D in different proportions, and different proportions of brownfields resulting from the abandonment of industrial areas due to deindustrialization and commercial suburbanization. By combining these approaches, a new division of morphogenetic

zones is created and follows, accounting for the approach of Ouředníček et al. (2012, p. 278, 284): (A) historical core (including central business districts – CBD, Kährík et al. 2015); (B) inner city built in the nineteenth to early twentieth century by tenement houses and working-class houses; (C) villa neighbourhoods from the early twentieth century; and (D) housing estates built in communist era (1948–1989). The inner city was divided into city districts: Smíchov, Holešovice, Karlín, and Vinohrady together with Žižkov district.

Results of Local Moran’s I of spatial distribution of CS in the Prague BSU before 2015 are depicted in Fig. 4 and showcase significant local spatial clusters of high-high values (“hotspots”) in inner city districts of Smíchov (B), Holešovice (C), and Vinohrady (E). These hotspots are concentrated in districts further away from the historical core zone, with lower rents and higher availability of empty commercial areas. This spatial pattern is also connected to the prevailing CS business model in this period: independent social entrepreneurship-oriented CSs. On the contrary, the spatial clusters of low-low values (cold spots) are located in the suburban periphery zone, which support an initial idea of CSs location in areas gaining from localization and urbanization economy. Diagnostics of local instability shows high-low values in districts of the historical core, western part of Smíchov district (B), Karlín district (D), and the housing estates south and west of the historical core. This gives

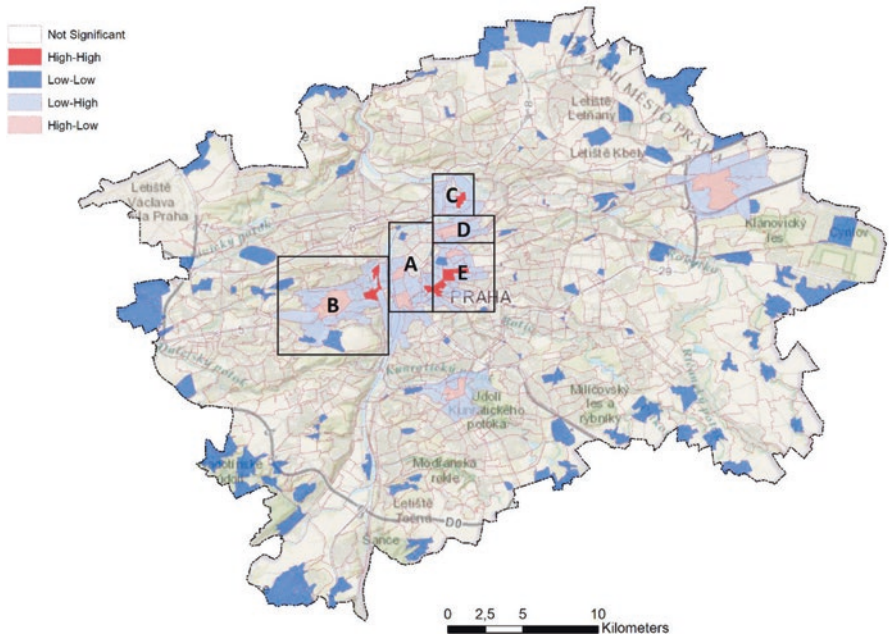


Fig. 4 Local Moran’s I scatterplot map for coworking spaces in Prague basic statistical units established prior to 2015

Source: Authors’ development based on Vlach (2020); base map ARCDATA PRAHA (2016)

Note: City districts A = historical core; B = Smíchov; C = Holešovice; D = Karlín; E = Vinohrady

evidence of isolated location of CSs in the BSU of these districts whose neighbouring units show a high decrease in CSs distribution, thus creating spatial heterogeneity in case of low-high clusters.

The spatial distribution analysis after 2015 (Fig. 5) indicated a change in the local spatial clusters of high-high values in inner city districts. The main concentration of CS clusters moved into Karlín (D) district, and, at the same time, a spatial diffusion occurred from the eastern part of Holešovice (C) district into its western part with higher rents and better public transport accessibility (underground). A similar, although less pronounced, process occurred in the eastern part of Smíchov (B) district. A significant change is the emergence of CS hotspots in the historic core, especially in proximity to the main shopping streets (Národní třída and Wenceslas square) where possibilities exist to revitalize commercial buildings or to demolish them and subsequently begin a new construction. Newly emerged CSs became sources of significantly deviated values (high-low values) in other districts of the inner city, north of the historical core (Dejvice and Libeň districts), or in the area of housing estates where an independent CS with social entrepreneurship (eastern part of the city) as well as a newly established open corporate CS (Bouncken et al. 2018, p. 398) of Microsoft were established.

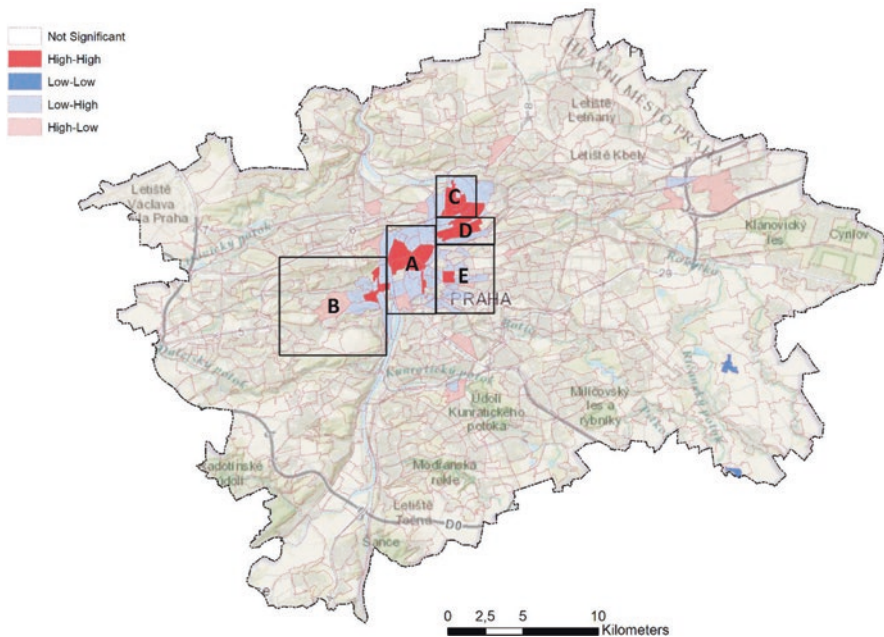


Fig. 5 Local Moran's I scatterplot map for coworking spaces in Prague basic statistical units established in and post 2015

Source: Authors' development based on Vlach (2020); base map ARCDATA PRAHA (2016)

Note: City districts A = historical core; B = Smíchov; C = Holešovice; D = Karlín; E = Vinohrady

A second form of spatial heterogeneity, spatial regime, is shown by the low-high values. These cases underline that the CS tends to localize exclusively in areas with a high concentration of commercial activities (historical core and Smíchov district) or in areas with intensive processes of commercialization and gentrification (Karlín and Holešovice districts, Kährík et al. 2015). Outside these areas with prevailing residential function, or tourism facilities (centre and northern historical core), they are almost absent.

Figure 6 shows statistically significant changes of CSs over time (2015–2019) in each BSU which is related to that of its neighbouring BSUs. The first positive spatial-temporal autocorrelation variation (high-high values) characterizes the historical core and Karlín (D) district. These cases show local spatial clusters of BSUs in which the number of CSs changes is statistically related to that of its neighbours. This confirms the highest CSs growth dynamics in historical core and Karlín (D) district in 2015–2019 and the spatial diffusion of these activities from Vinohrady (E) district. Vinohrady district itself shows low dynamics, and the number of CSs is still similar to 2015 (low-low values). At the same time, the significance of Karlín (D) district as a district with one of the most important concentrations of CSs in Prague is growing. The negative spatial-temporal autocorrelation variation (low-high values) creates spatial instability in BSUs in close spatial proximity to

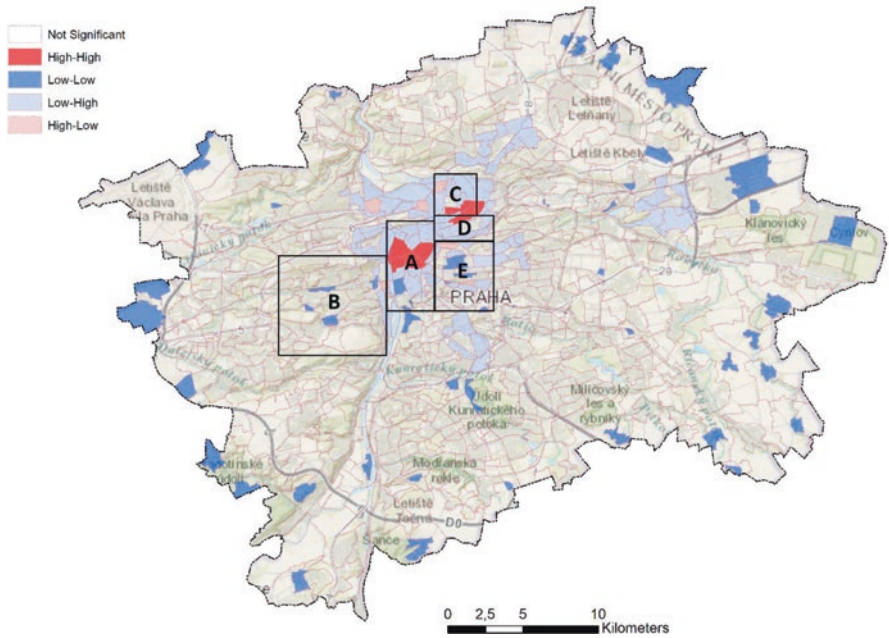


Fig. 6 Differential local Moran’s I scatterplot map for coworking spaces in Prague basic statistical units 2014–2019

Source: Authors’ development based on Vlach (2020); base map ARCDATA PRAHA (2016)

Note: City districts A = historical core; B = Smíchov; C = Holešovice; D = Karlín; E = Vinohrady

high-high clusters. The spatial dynamics of CSs development in Prague is a very selective process related to intense urban change in physical, functional, and social spatial structure of the city – commercialization, intensification of urban fabric, brownfields regeneration, and physical renewal. On the contrary, high-low values are represented by isolated BSUs of spatial instability especially west of Holešovice (C) district and north of historical core in the area of Dejvice where a single CS was established and it is spatially tied to important infrastructure and tertiary education in the field of architecture.

The spatial distribution of CSs in Prague can be explained by the city's urban changes, which mainly concern the urban and social transformation during the post-communist period (Sýkora and Bouzarovski 2011, p. 46; Ouředníček et al. 2012; Kährík et al. 2015). The concept of Prague's social transformation includes the above-mentioned internationalization of CS activities in Prague with the resulting change of economic structure of the transformed areas evidenced by the increase in KIBS activities and hi-tech industries, as well as the change of spatio-temporal patterns in use of the city and commercial office spaces. The results of this economic component of social transformation also include the social component in the form of increasing social polarization of the affected areas (Kährík et al. 2015). Furthermore, the changes suffer from the neoliberal approach of post-communist cities to their urban development (ibid), which is reflected in property-led urban regeneration. This approach is further supported by the novelty of CS as a part of shared and creative economy. The CSs in Prague are so far in no way supported or regulated by public policies. Except for international/global CS providers, the renters who are freelancers or micro-enterprises do not have the lobbying power.

Conclusion Remarks

Digitalization and the increase of creative and innovative industries enhanced the concentration and colocation of CSs and the emergence of the clusters of input suppliers (Johansson and Forslund 2008) in selective, spatially sharply delimited parts of the cities. This strengthens the statements of Boschma (2005) on the mediator role of spatial proximity to other types of proximity (organizational, social, institutional, and cognitive) and a need for face-to-face contacts for the implementation of project-oriented activities of creative industries and other KIBS (Mariotti and Akhavan 2020b). The environment of the clusters can support horizontal spillover externalities (Jacobs knowledge spillover) between individual CS and help to develop a creative milieu desirable for producing innovations and sharing tacit knowledge.

The analysis of the CSs location and diffusion in Prague and Milan shows differences and similarities. The main location factors of CSs in Prague and Milan refer to those of the service sectors with a slight difference in the two cities. Besides, the sectors of the CSs mainly belong to the creative industry, and those in Prague, established before 2015, offer several social services: from support to female

entrepreneurship by providing babysitting services to support to individuals, freelancers, and start-ups by providing opportunities for consultations, range of workshops, and community events. In Milan these services are supplied by few CSs; however, CSs may impact on community building, with the subsequent creation of social streets, the improvement of the surrounding public space, and urban revitalization, both from an economic and spatial point of view (Akhavan et al. 2019).

As concerns differences, Prague started attracting CSs later than Milan. The first CSs in Milan were born in 2008, during the economic recession, and have experienced a significant growth rate in 2013 and 2014. In contrast with Milan, Prague shows a very limited colocation with innovative infrastructure (universities and research centres); besides, in Prague the neighbourhoods where the number of immigrants from developed countries (Western Europe, the USA, and Canada) is, on average, higher are more attractive. Even in Milan the gentrified areas are more attractive, but they are not massively populated by immigrants from developed countries. Differences also refer to the CSs business models, with CSs in Prague before 2015 being mainly community-oriented CSs supporting social causes while those after 2015 mainly business-oriented CSs owned by global CS providers. Specifically, in the first phase, the inner city went through the spatial pattern of selective spatial concentration by business-oriented CSs and community-oriented CSs. In the second phase (after 2015), the business-oriented CSs and internationalization caused a radical change of spatially pattern of CSs localization. The future challenge lies in the currently under-construction CS of IWF provider (Spaces) in Pankrác area south of Vinohrady. Together with Microsoft's open corporate CS, it can lay foundation to new spatial diffusion with the first large-scale concentration of CSs in new secondary commercial centres outside of the historical core and the inner city.

Milan, on the other hand, has been mainly characterized by private CSs developed within a bottom-up approach and in several cases subsidized by the Municipality of Milan and by the city council which assigned public abandoned spaces to private initiatives in order to develop innovative working places. After the economic crisis of 2008, the city has enhanced its high levels of entrepreneurship and social cooperation, integrating them with both ICT innovations and the sharing economy growth.

Finally, the analysis of the micro-location of CSs in relation to the internal urban spatial structure and its transformation underlines that in both cities a transition to the polycentric city model occurred.

In Prague this has been favoured by foreign providers, in cooperation with local or international landlords, which focused on different types of urban transformation such as intensification of urban fabric (WeWork), urban regeneration of outdated office spaces (WorkLounge), or reconversion of already existing large-scale professional spaces into CSs – Spaces and HubHub. With other local CS providers, we may expect more of reconversion rather the commercialization, which took place in the historical core as early as the 1990s due to the absence of business spaces in connection with the transition to the market economy (Sýkora and Bouzarovski 2011).

In Milan, the new urban development projects (Garibaldi-Repubblica, Porta Romana, and Scalo Farini) have attracted and are attracting CSs, which moved to

these areas when the real estate prices were still lower than the average in more central areas. These areas became new centralities of the city.

The present chapter presents some limitations mainly related to the lack of direct interviews addressed to the CS managers in the two cities, which might have allowed to better understand the development, typology, and dynamics of spatial distribution of CSs. Further research might focus on the effects of the COVID-19 pandemic on CSs and coworkers in the two cities to understand the drop of the occupancy in the CSs as well as their “mortality” rate. Besides, it should be interesting to investigate whether the negative effects of the pandemic differ in the two cities and whether policy measures have played a role in containing the crisis of the CS model.

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