# Spatial patterns and characteristics of coworking spaces in Bratislava

Bachelor's thesis

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# Summary

In recent years, the capital city of Slovakia, Bratislava, has created a lucrative environment for a rapid increase of new businesses, start-ups, organizations, and creative spaces. Knowledge professionals, entrepreneurs, freelancers, and digital nomads, among whom are people working in creative industries use coworking spaces rather than contemporary offices. Due to the design of these shared workspaces, they are great places for collaboration, building of community, and knowledge sharing. They can be considered local accelerators of entrepreneurship within communities because they attract new urban populations.

As they have an impact on the economy of the city, it is relevant to formulate policies for these places to thrive. The understanding of where coworking spaces in Bratislava are located and what spatial patterns they share can be beneficial for future investors, city government, but also for policymakers. Therefore, the main research question of this paper is: What are the spatial patterns and characteristics that influence the location of coworking spaces in Bratislava, Slovakia?

Five areas of interest were examined, namely, the location of coworking spaces and whether they are clustered. Types of zones they are located in and whether they are accessible by public transport. Lastly, what is their accessibility to urban amenities, governmental institutions, and universities? For this research, secondary data sources were used and analyzed using ArcGIS tools.

The results show that the spatial patterns and characteristics of the current coworking spaces in Bratislava are their spatial clustering, their easy access to public transport, proximity to restaurants, but also to coffee shops, and bars. The availability of supermarkets and the vicinity of governmental institutions and universities cannot be considered as their spatial pattern. To provide some recommendations for city governments and investors, new coworking spaces in Bratislava should be located in the historic city center or the other three hotspots identified, near restaurants and public transport stops.

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# Introduction

Bratislava is the capital city of the Slovak Republic, as well as being its largest one (Lavčák et al., 2019). The city is situated at the southwestern border of the republic and spreads over both sides of the river Danube (Lavčák et al., 2019). According to Lavčák et al. (2019), it is strategically situated just 79 kilometers from Vienna and near the Czech and Hungarian borders. Therefore, due to its location, it became a place where many local headquarters of important international companies reside (Lavčák et al., 2019). In recent years, Bratislava has created a lucrative environment for a rapid increase of new businesses, start-ups, organizations, and creative spaces (Lavčák et al., 2019). In 2021, the distribution of GDP was 59,14% from the service sector, 28,19% from industry, and agricultural production contributed by 1,74% (Statista, 2023). Important industries in Slovakia are automotive, machinery, electronics, engineering, chemicals, and many more (Carter et al., 2023) (International Trade Administration U.S. Department of Commerce, 2022).

According to Rehák et al. (2013), in 2013, around one-third of the Slovak companies were located in Bratislava and more than half of the creative industry companies in Slovakia were in the capital. Figure 1 shows the clustering of the creative industry in Bratislava and other major urban areas in all three categories mapped by Rehák et al. (2013) (Bratislava is located at the tip of the arrow). Newer research conducted by Baláž et al. (2022) also proves that Bratislava has the highest share of the creative industry per district (Figure 2).

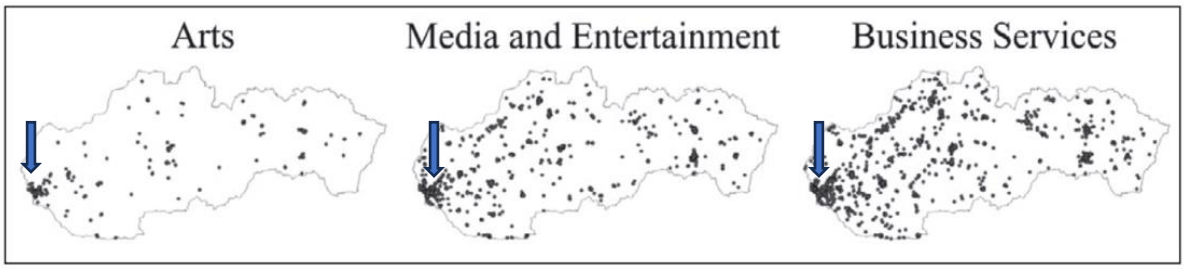


Figure 1: Point pattern of creative industry by sector category

*Source: Rehák et al. (2013) using Business Register of the Slovak Republic (Infostat), adjusted by the author*

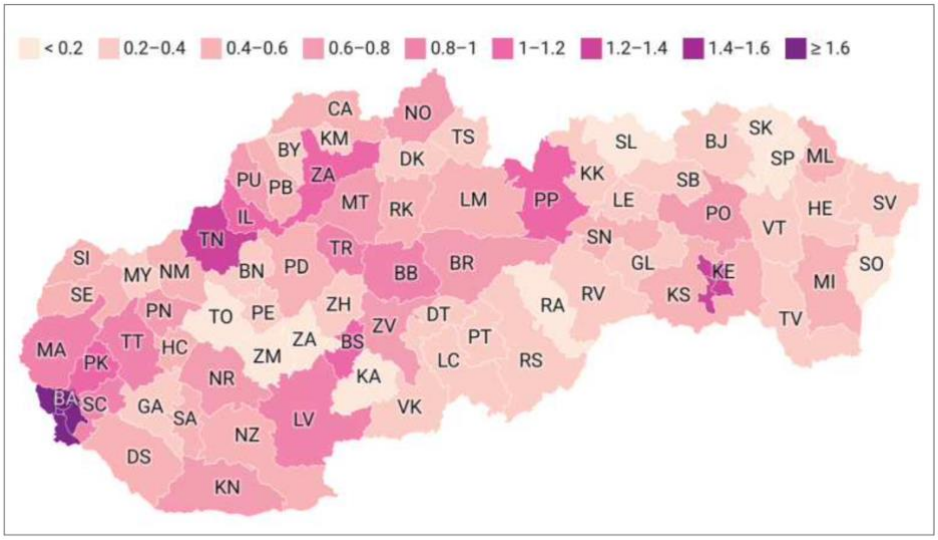


Figure 2: Percentage shares of specific districts in the national creative small business economy

*Source: Baláž et al. (2022)*

Furthermore, Bratislava was also the first city in Slovakia where the first major coworking spaces and young innovative businesses emerged in 2010 (Lavčák et al., 2019). However, in recent years, Slovak Government noted a relatively low development level in the creative industry (Baláž et al., 2022). For comparison, in 2019 the share of creatives working in Slovakia was 0,58% of all occupations while the EU27 average was 2,4% (Baláž et al., 2022). Therefore, according to Baláž et al. (2022), Slovak Government launched its first national creative voucher scheme. Four creative industries were eligible for the subsidies: design; architecture; advertising and marketing; and software, information, and communications technology services (Baláž et al., 2022). The highest share of total voucher support (33%) was received by companies in the city of Bratislava. Figure 3 shows a network analysis of the regional patterns of cooperation by creative and conventional firms, where the size of the circle represents the amount of cooperation. Cities in circles are color coded based on the regions they belong to while the lines represent cooperation between cities. The line thickness represents the amount of the monetary value of vouchers exchanged among or within cities (BA stands for Bratislava). This further supports the claim that the highest share of the creative industry in Slovakia is located in Bratislava.

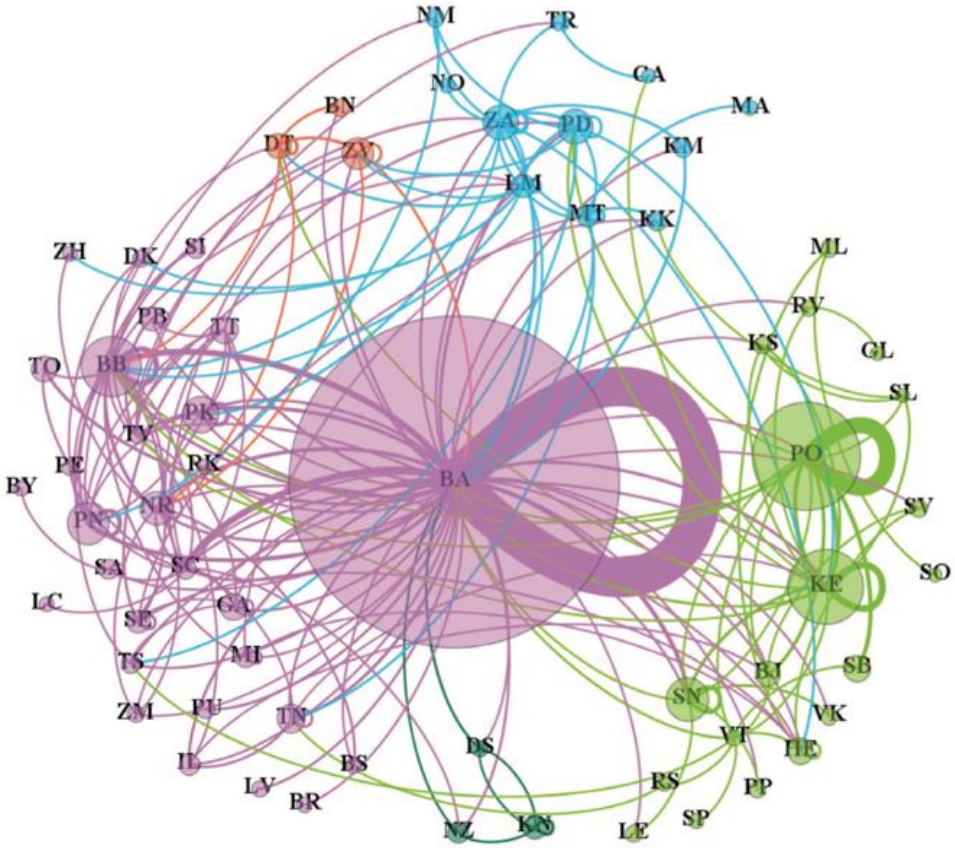


Figure 3: Regional patterns of cooperation by creative and conventional firms

*Source: Baláž et al. (2022)*

As previously mentioned, Bratislava is experiencing an increase in start-ups and new businesses. The national creative voucher scheme subsidizing the creative industry was mostly drawn by firms in Bratislava. Therefore, there emerges a question: Where do all these people work? According to Mariotti et al. (2017), coworking spaces are places designed to accommodate knowledge professionals and entrepreneurs, among which are people working in creative industries. Due to the design of coworking spaces, they are great places for collaboration, the building of community, and knowledge sharing (Sutriadi & Fachryza, 2021; Nash et al., 2021). Furthermore, coworking spaces are financially accessible (Mariotti et al., 2021) as the service costs of the space are divided among the users while they can also be more flexible in renting spots for example only few days per week. This plays a significant role for emerging companies, freelancers, start-ups, and creatives who usually lack enough capital to afford private office spaces.

The quickly emerging coworking space sector (Coll-Martínez & Méndez-Ortega, 2020) is a subject of myriads of research throughout the world. However, as far as this research can conclude, no research has been done on the location pattern of coworking spaces in Bratislava, Slovakia. As Orel et al. (2020) argue, the understanding of where coworking spaces are located can be used by policymakers to formulate relevant policies for these

areas since coworking spaces are contemporary entrepreneurial hubs and can have an impact on the economy of the city. Furthermore, from the national perspective, accommodating creatives in new coworking spaces might help to reach the average EU level of people working in the creative industry where Slovakia is falling behind. Thus, this research aims to find out whether common spatial characteristics between coworking spaces in Bratislava exist.

Therefore, the main research question of this paper is:

*What are the spatial patterns and characteristics that influence the location of coworking spaces in Bratislava, Slovakia?*

The structure of this research paper is as follows. Firstly, the theoretical framework explains what the creative industry is and why it is relevant when speaking about coworking spaces introduce. Then, the basic concepts and principles of coworking spaces and their spatial characteristics are introduced. The following methodology part dives deeper into the procedure of obtaining necessary data and conducting the research. Consequently, the main findings of the research are explained in the results part. The discussion and conclusion section provides a link between the findings and the theoretical framework, lists suggestions for further research possibilities, and lastly, reflects on the strengths and weaknesses of the results and obtained data.

# Theoretical framework

The theoretical framework will define the following concepts that are necessary for a proper understanding of this research paper. From these concepts and their link to the main research question, conceptual model follows. The theoretical framework ends with the expectations for this research.

## *Creative industry*

For the first time, the term creative industry emerged in the 1990s (Bendassolli et al., 2019). The name of the sector indicated that creativity is an essential dimension of the business (Bendassolli et al., 2019). Creative industries include businesses around advertising, architecture, arts, crafts, design, fashion, film, software, music, performing arts, the publishing industry, radio, and many more (Bendassolli et al., 2019).

According to Rehák et al. (2013) and Baláž et al. (2022), creative industries concentrate in larger cities and capitals. This is, firstly, due to the spatial concentration of economic factors, inhabitants and firms, in cities. Secondly, companies working in the creative industry need to network with other firms in their sector, thus, the size of the market matters, and larger cities often provide larger markets. Moreover, "Large cities attract talent and provide creative firms with a supply of skilled labor. " (Baláž et al., 2022, p.100).

The creative industry creates both direct and indirect effects on regional and national economies (Baláž et al., 2022). Among direct impacts we can categorize growth in employment and value added (Baláž et al., 2022). A major indirect effect is a knowledge and creativity spillover (Baláž et al., 2022) but also an occurrence of talent pools (Orel et al., 2020). Therefore, the presence of talented and skilled people in cities where creative industries reside is necessary for its further expansion and development in order to boost the country's economy (Lavčák et al., 2019). As previously mentioned, the highest share of the creative industry in Slovakia is in Bratislava.

## *Coworking spaces*

Contemporary coworking spaces emerged somewhere at the end of the 1990s (Helio, n.d.) and at the beginning of the twenty-first century (Orel et al., 2020). Among the first cities to accommodate coworking spaces were Berlin, Stockholm, Vienna, and San Francisco (Helio, n.d.; Orel et al., 2020). Since then, interest in coworking spaces is on the rise. In the year 2010, around 21 000 people worked in coworking spaces worldwide (Chevtaeva & Denizci-Guillet, 2021). By the end of 2019, there were an estimated 22 400 coworking spaces around the world (Orel et al., 2020) accommodating nearly 2,2 million people (Chevtaeva & Denizci-Guillet, 2021). Most researchers suggest that coworking spaces are a new urban phenomenon (Coll-Martínez & Méndez-Ortega, 2020; Sutriadi & Fachryza, 2021) and we can find them predominantly in advanced economies (Coll-Martínez & Méndez-Ortega, 2020).

According to Sutriadi & Fachryza (2021), coworking spaces are collaborative workplaces where people can work in teams or independently and their main advantage is that they can share information, knowledge, ideas, and uncommon equipment. This shift in a type of workplace from conventional offices to shared workspaces is a reflection of knowledge workers becoming more flexible, independent, and working on project-based tasks (Sutriadi & Fachryza, 2021). Workers can either rent a desk (Mariotti et al., 2021), or a private room (Nash et al., 2021), but some spaces also provide conference rooms.

The first known coworking space, C-base, emerged in Berlin in 1995 as a shared workplace for hackers (Helio, n.d.). Its initial idea was to create a space for exchanging knowledge, working on coding projects together, creating seminars, and social events (Helio, n.d.). In 2002, Schraubenfabrik, a community center for entrepreneurs, opened in Vienna (Orel et al., 2020). Hence, we can see that the early shared working spaces were created for specific members of a community or a profession (Orel et al., 2020). However, with the increased popularity of this concept, coworking spaces are now occupied by a larger range of individuals working in various fields (Orel et al., 2020).

Nowadays, the target groups that seek coworking spaces are freelancers, digital nomads, multiple types of knowledge professionals, creatives, and start-ups, working in many different degrees of specialization in the knowledge and creative industry (Chevtaeva & Denizci-Guillet, 2021). In some countries, coworking spaces are predominantly used by digital nomads (Nash et al., 2021), location-independent individuals working remotely who enjoy leisure travel in a foreign country without the need of taking a break from their occupation (Chevtaeva & Denizci-Guillet, 2021). However, in Europe, many shared workspaces are used by local freelancers, entrepreneurs, local companies, and start-ups (Chevtaeva & Denizci-Guillet, 2021; Orel et al., 2020; Mariotti et al., 2017).

Coworking spaces are attractive to people for several reasons. One of them is an environment that breaks isolation and engages in collaboration (Mariotti et al., 2017). As previously mentioned, they are financially more available than regular office spaces because the costs and facilities are shared among users (Coll-Martínez & Méndez-Ortega, 2020) (Orel et al., 2020), hence, ideal for emerging companies or individuals with limited budgets. This is especially beneficial during post-recession periods with increasing rents (Coll-Martínez & Méndez-Ortega, 2020).

Many people choose coworking spaces because they seek an environment that creates a feeling of community (Nash et al., 2021). Some even pay more to enjoy both social and work interactions (Nash et al., 2021). They can increase one's skillset (Orel et al., 2020), promote collaboration and naturally cause a knowledge spillover, thus increasing business opportunities (Mariotti et al., 2021). They enable people to be more flexible, both timewise

and space-wise (Orel et al., 2020). In that spirit, many users of coworking spaces value good public transport connections around these shared spaces (Zhou, 2019).

Many claim that the multitude of emerging coworking spaces can influence the neighborhoods and cities they are located in (Mariotti et al., 2017). Because of their innovative concept and design, they attract new urban populations, predominantly professionals or as Richard Florida calls them, the creative class (Florida, 2014; Mariotti et al., 2017). Bohemians, artists, creatives, entrepreneurs in high-tech industries, and others working in similar professions are attracted to the environment that vibrant urban areas offer (Coll-Martínez & Méndez-Ortega, 2020). As Orel et al. (2020) claim, "…coworking spaces identify themselves as local accelerators of entrepreneurship within communities, contributing to positive social change in their local environments." (p. 1525).

In conclusion, Sutriadi & Fachryza (2021) claim that coworking spaces work on five principles: collaboration, community, sustainability, openness, and accessibility. A collaboration between members of coworking spaces, a sense of community at the workplace, a relatively more sustainable way of working, an open environment with a welcoming atmosphere, and both financial and physical accessibility of the space.

### *Spatial characteristics of coworking spaces*

There exists a major overlap in theory about spatial characteristics of coworking spaces in academic literature. Therefore, the following section summarizes these spatial characteristics based on the research of Baláž et al. (2022), Coll-Martínez & Méndez-Ortega (2020), Mariotti et al. (2017), Mariotti et al. (2021) and Zhou (2019).

The spatial characteristics of coworking spaces in researched areas of the world can be categorized into the following groups. Firstly, coworking spaces are in close proximity to urban amenities such as restaurants, cafés, pubs, parks, gyms, and grocery stores. These amenities are desired by the users of coworking spaces as they offer leisure during or after work hours. Secondly, coworking spaces are usually situated close to research and specialized human capital training centers, for example, universities or governmental institutions as they often facilitation collaboration, knowledge exchange and business opportunities. Thirdly, easy access to public transport is one of the most occurring criteria for the location of a coworking space. People using coworking spaces often need fast, flexible, and reliable mobility, therefore, they use public transport. Nowadays, bike sharing can also be considered an effective and sustainable solution for urban mobility.

The fourth feature is the location of coworking spaces in high-income neighborhoods. This is true since coworking spaces are often located in Central Business Districts (CBD) or in the city centers where the price of rent is sometimes higher, therefore, only affordable by high-income households. However, this is not always the case for each city. For example, in the

case of Milan, coworking spaces are at a larger distance from the center of the city because of high real estate prices and low availability of office spaces.

Moreover, the reason why these coworking spaces are situated in the central areas of cities is that for the people working in them, they provide a greater chance of meeting both suppliers and customers. Lastly, coworking spaces are highly clustered and located in mixed-use areas because they allow easier access to urban resources and amenities. All spatial characteristics are visually represented in Figure 4.

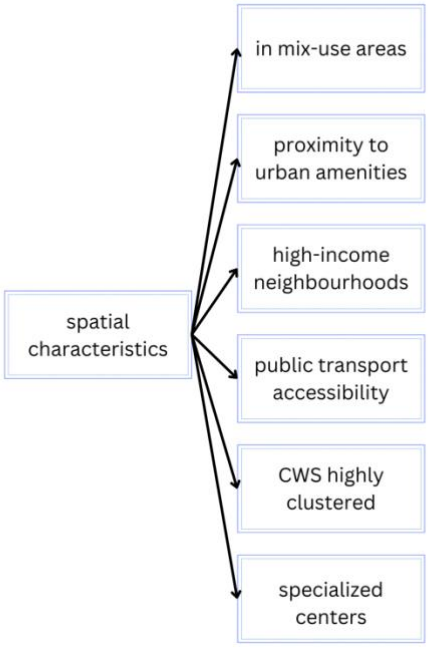


Figure 4: Visual representation of spatial characteristics of coworking spaces

*Source: Created by the author*

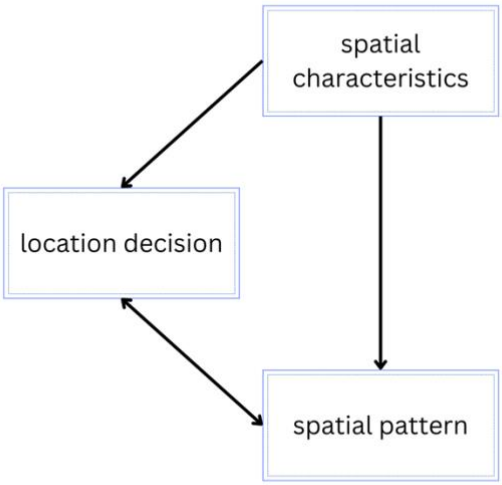


Figure 5: Conceptual model

*Source: Created by the author*

The conceptual model (Figure 5) portrays the relationship between the location decision of an investor or owner of the coworking space, the spatial characteristics of coworking spaces and their spatial pattern. Types of spatial characteristics are explained in more detail in the section above and those that were explored during this research are listed in Figure 4. The spatial characteristics and the patterns influence the decision of the party to locate the coworking space in certain areas.

### *Hypothesis*

Based on the academic literature research, there arise several hypotheses about spatial characteristics and patterns of coworking spaces in Bratislava.

1. Coworking spaces in Bratislava are clustered.
2. Coworking spaces are situated in mixed-use zones.

3. There is good public transport accessibility around coworking spaces in Bratislava with several stops within short walking distance.
4. There are numerous amenities such as coffee shops, restaurants, bars, and supermarkets within walking distance of coworking spaces.
5. Coworking spaces are in close proximity to university buildings and/or governmental institutes.

# Methodology

This research paper uses secondary data obtained through various websites, among which are the official websites of the Slovak Republic, GIS (Geographic Information System) layers from Geoportal Bratislava, IDS BK (Integrated transport system in the Bratislava region), and Open Street Map to answer the research question. The tool used to investigate spatial patterns and the location of coworking spaces is ArcGIS. Maps were created to visualize spatial patterns of amenities, public transport and coworking spaces.

The location characteristics of coworking spaces analyzed are based on the academic literature. Consequently, there arise five hypotheses about spatial characteristics and patterns of coworking spaces in Bratislava as previously mentioned. Therefore, for the purpose of this research, five areas of interest were examined.

## *Location and clustering*

The first data analysis investigated the location of coworking spaces in Bratislava and whether they are clustered in certain areas. For this purpose, the following data were needed. Firstly, the location of all coworking spaces in Bratislava. This information is necessary not only for determining whether coworking spaces are clustered but also for further analysis of other characteristics.

The list was compiled using an internet portal Nomad list (n.d.). However, some of the information was outdated and several spaces no longer exist. Therefore, those were not added to the list. Furthermore, other coworking spaces, mostly those established in the past couple of years, were missing from this portal and were further added to the list based on a Google search. The keywords used to explore all the coworking spaces via Google search were “Bratislava” and “coworking spaces”. Furthermore, to calculate the density of coworking spaces, Kernel density, an ArcGIS analysis tool, was used. The Kernel Density tool calculates the density of features in an area around those features (Esri, n.d.). In the case of point features as were used in this analysis, the density is calculated around each output raster cell. Appendix 1 provides the names and addresses of all coworking spaces that were in use in Bratislava by March 2023.

## *Zones*

According to Zhou (2019), coworking spaces are situated in mixed-use areas because of easier access to urban amenities. To investigate whether this is true for coworking spaces in Bratislava, coworking spaces were mapped in the territorial plan with the zoning of Bratislava accessible on Geoportal Bratislava (n.d.).

## *Accessibility*

To explore the accessibility of public transport around coworking spaces, IDS BK offers a GIS layer of all bus, tram, and trolley bus stops in Bratislava, which was used (IDS BK, n.d.). An

ArcGIS tool Kernel Density was applied to analyze whether there exist clusters of public transport stops and if so, whether they are close to coworking spaces. According to El-Geneidy et al. (2014), "The transit industry widely applies the 400-meter (0.25-mile) and 800-meter (0.5-mile) rules of thumb when estimating service areas around bus and rail stations." (p. 198). Therefore, a 400-meter-wide buffer (as birds fly) was created around each coworking space since the majority of the stops are either bus or tram stops and not train stations that would require an 800-meter buffer. Then, by using the ArcGIS tools Spatial Join and Dissolve, the number of stops per buffer was calculated.

### *Amenities*

To investigate whether there are coffee shops (a small restaurant, often in a store, hotel, etc., where coffee, tea, other drinks without alcohol and simple food are served - definition by Oxford Dictionary), restaurants, bars (a place where you can buy and drink alcoholic and other drinks - definition by Oxford Dictionary), and supermarkets around coworking spaces, OpenStreetMap (n.d.) was used.

To examine this, a buffer around each coworking space was set to 1 kilometer (as birds fly) which relates to a distance walkable by a healthy individual in around 10 to 12 minutes. Same as for the analysis of accessibility, ArcGIS tools Spatial Join and Dissolve were used to calculate the number of each of the amenities within a 1-kilometer radius of coworking spaces.

### *Universities and governmental institutes*

Another spatial characteristic explored was the proximity of coworking spaces to universities and governmental institutes. The list and location of all governmental institutes in Bratislava was created based on the institution directory published by the Slovak Government Office (2016), see Appendix 2. The list and location of all the faculties of all universities located in Bratislava was compiled in two steps. Initially, the list of all universities in Bratislava is based on the official website of the Ministry of Education, Science, Research and Sports of the Slovak Republic (n.d.). However, this website does not offer addresses of these universities and their faculties. Therefore, the official websites of all the universities were explored and addresses were assigned to them, see Appendix 3. To analyze the data, the same procedure was used as in the case of amenities.

# Results

The results are categorized based on the five hypotheses presented in the theoretical framework.

## *Coworking spaces are clustered*

Based on the Kernel Density analysis in ArcGIS, coworking spaces in Bratislava are primarily clustered in the historic city center and its immediate proximity (Figure 6). Despite the main cluster in the city center, there can be further identified three areas with coworking spaces. The smallest one being in the neighborhood of Petržalka, on the southern bank of the river Danube with two coworking spaces. Three working spaces are close to each other in the western part of the city close to the Austrian border. The last cluster with four coworking spaces can be found north-eastern from the city center. To conclude, we can accept the initial hypothesis that coworking spaces are clustered, at least partially.

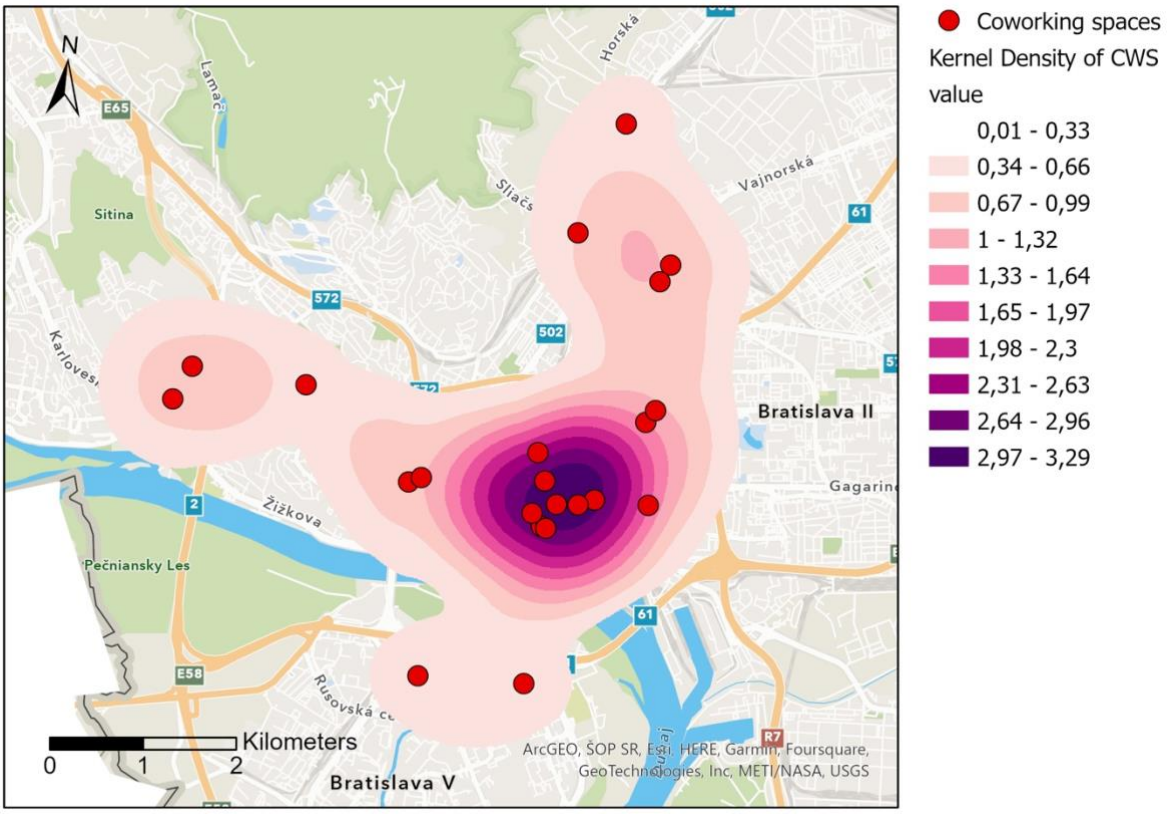


Figure 6: Location of coworking spaces and Kernel Density

*Source: Created by the author*

## *Coworking spaces are in mixed-use zones*

Initially, it is crucial to mention that areas in the territorial plan of Bratislava are fragmented into numerous parts, most of them with a small surface area. This fact plays a role in the potential explanation of why the results might not be in line with the previously mentioned

theory that coworking spaces are usually situated in mixed-use areas. Due to the small size of these plots, it is possible that even though a coworking space lies in for example a residential area, the areas surrounding it are commercial, and therefore there is easy access to urban amenities.

Out of the 22 coworking spaces, 13 are located in areas designated for civic amenities, either of local or city-wide/ supra-city importance, representing 59% of all coworking spaces. Five coworking spaces can be found in mixed-use areas accounting for nearly a quarter of all coworking spaces and four are in residential zones. A more detailed classification with the percentage proportions can be found in Figure 7. Furthermore, since not all coworking spaces are located in mixed-use areas, we cannot accept the second hypothesis.

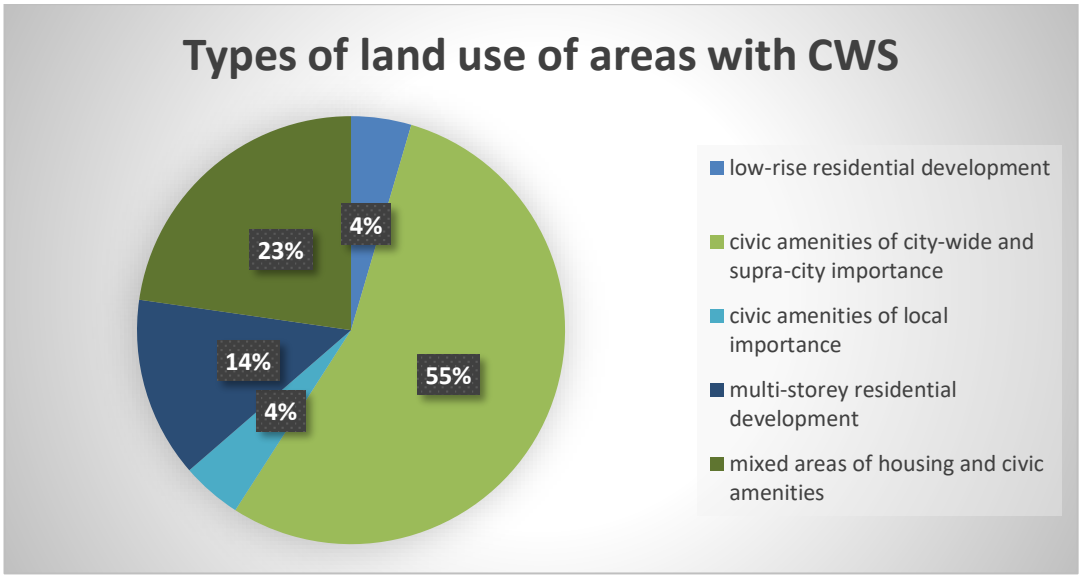


Figure 7: Types of land use of areas with coworking spaces

*Source: Created by the author*

### *Good accessibility of public transport around coworking spaces*

By using ArcGIS, the Kernel Density of all the public transport stops was calculated (Figure 8). This was done to visually examine whether the coworking spaces are in or around areas with dense occurrence of stops. As is visible in Figure 8, no conclusions can be drawn from the map as the number of clusters of stops is great.

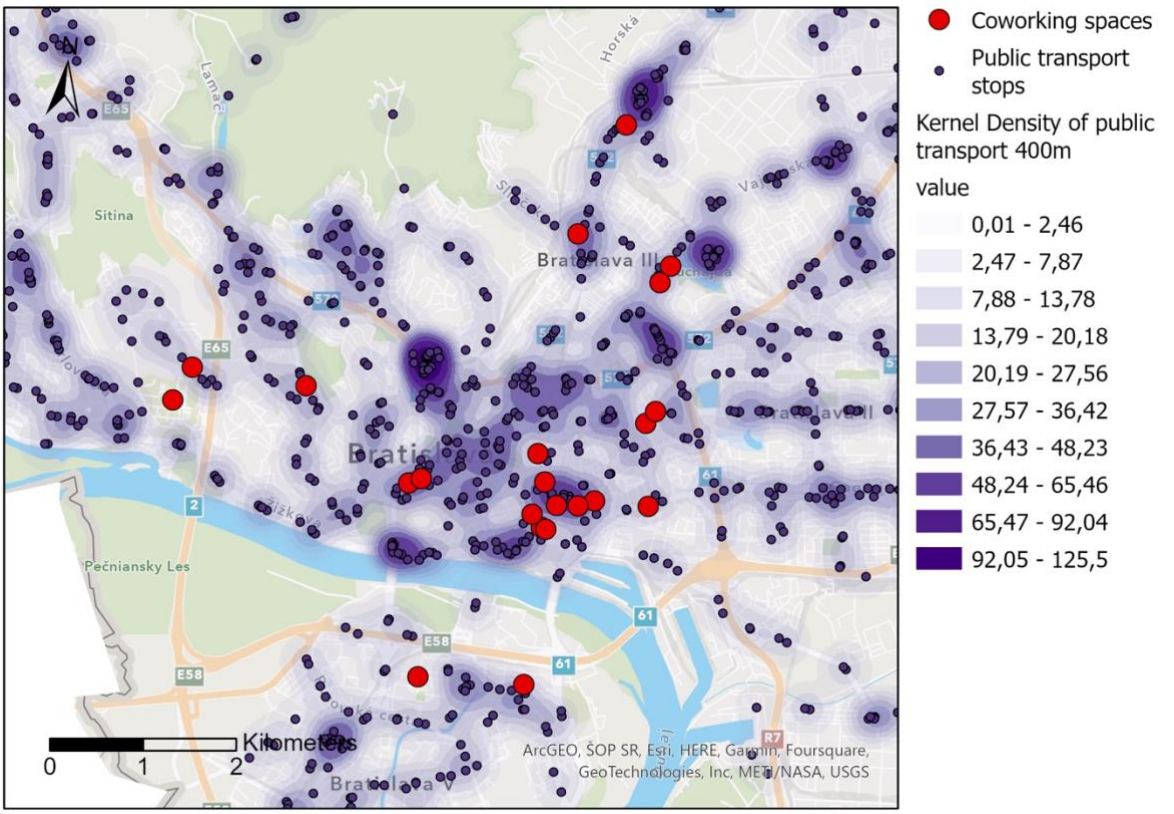


Figure 8: Kernel Density of public transport stops in Bratislava

*Source: Created by the author*

Therefore, 400-meter-wide buffers around coworking spaces (Figure 9) and spatial joins provide numerical data that are more relevant for comparison. The average number of public transport stops per buffer is close to 12, while the minimum is 3 and the maximum is 19 stops (Figure 10). Based on these numbers, we can say that while public transport stops are within a short walking distance from coworking spaces, their numbers vary.

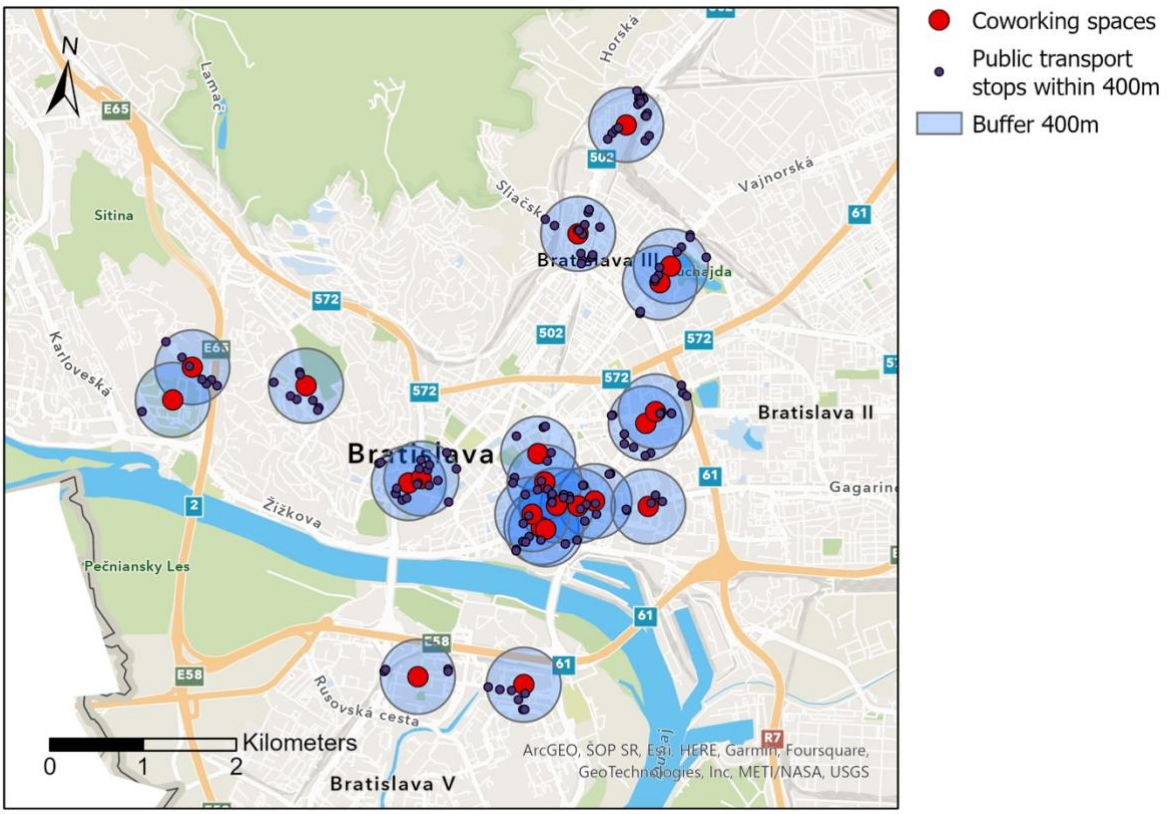


Figure 9: Public transport stops within 400 meters from coworking spaces

*Source: Created by the author*

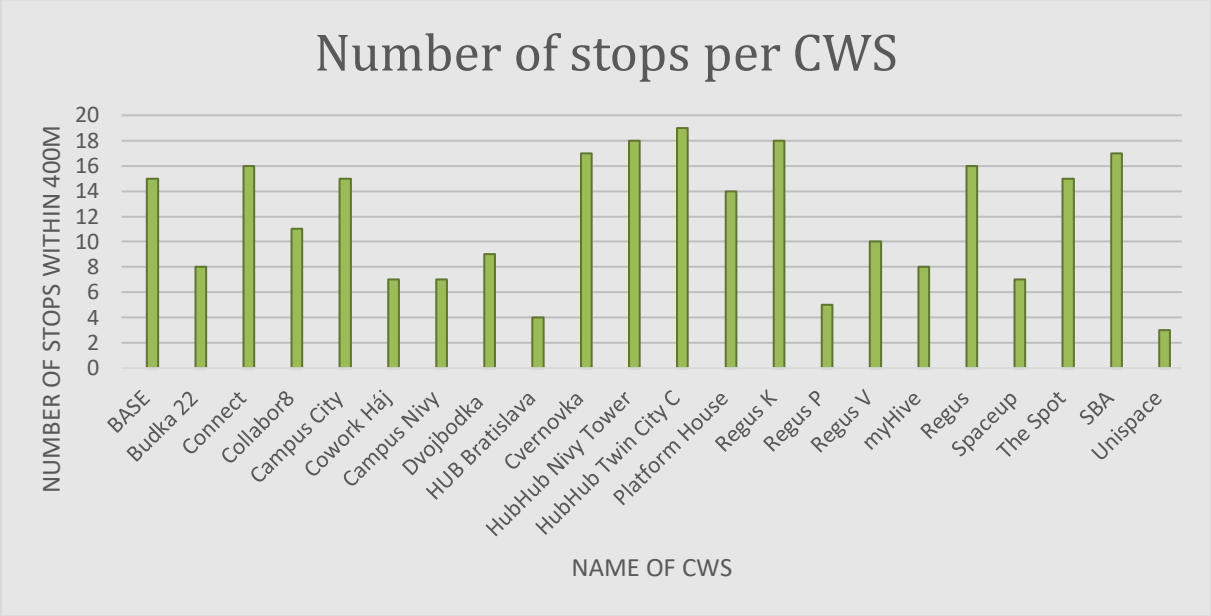


Figure 10: Number of public transport stops per coworking spaces within radius of 400m

*Source: Created by the author*

### *Proximity to restaurants, coffee shops, bars, and supermarkets*

From the graphs provided below (Figures 11 and 12), it is evident that the prevailing amenity within 1km buffers are restaurants while the supermarkets create the smallest share. On average, there are 116 restaurants per buffer, however, the lowest number of restaurants are around the coworking space Budka 22 with only 6. On the other hand, Regus has 295 restaurants within a 10-minute walk. The average number of coffee shops is 53 but 6 coworking spaces have less than 8 coffee shops within 1 kilometer. This is in a large disproportion with five spaces that have over 100 coffee shops within their buffers. There are 28 bars on average per coworking space with the highest number of 106 and the lowest of 4 bars per space. On the other hand, supermarkets are more evenly distributed (see Appendix 7) with an average of 9 supermarkets per buffer but the differences between buffers can still be seen (Figure 12).

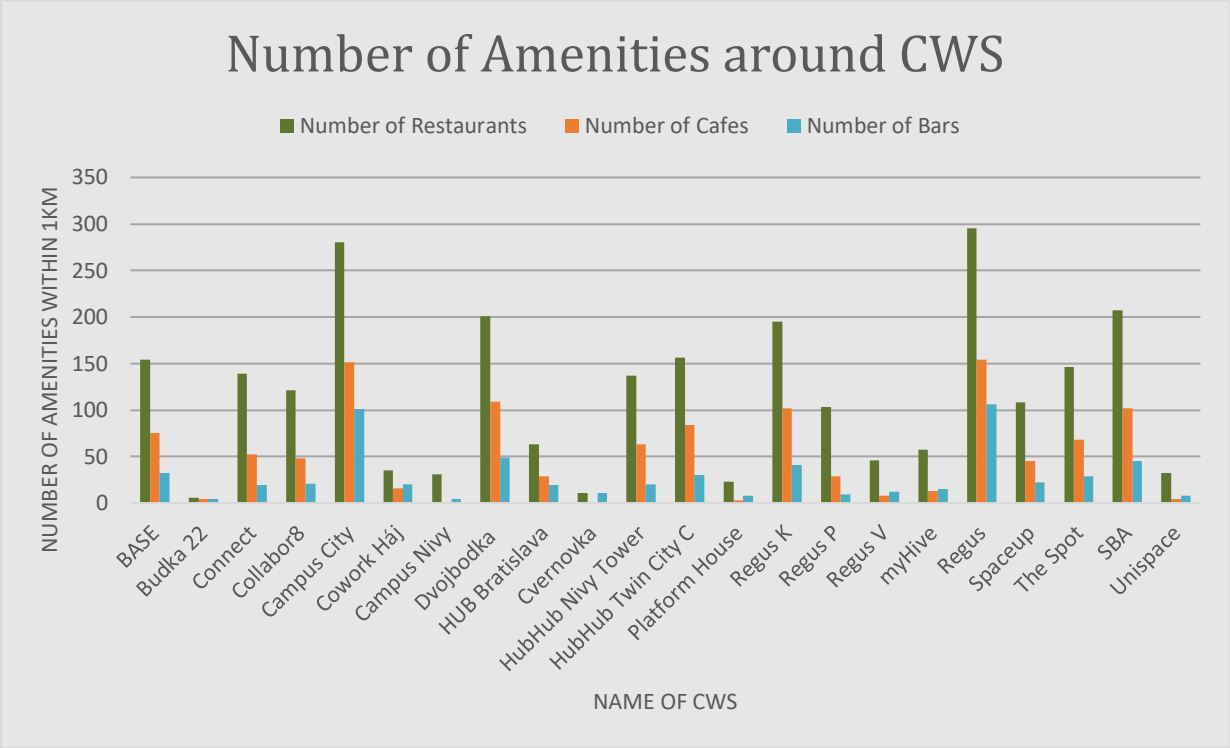


Figure 11: Graph showing the number of amenities within 1km radius from coworking space (CWS)

*Source:* Created by the author

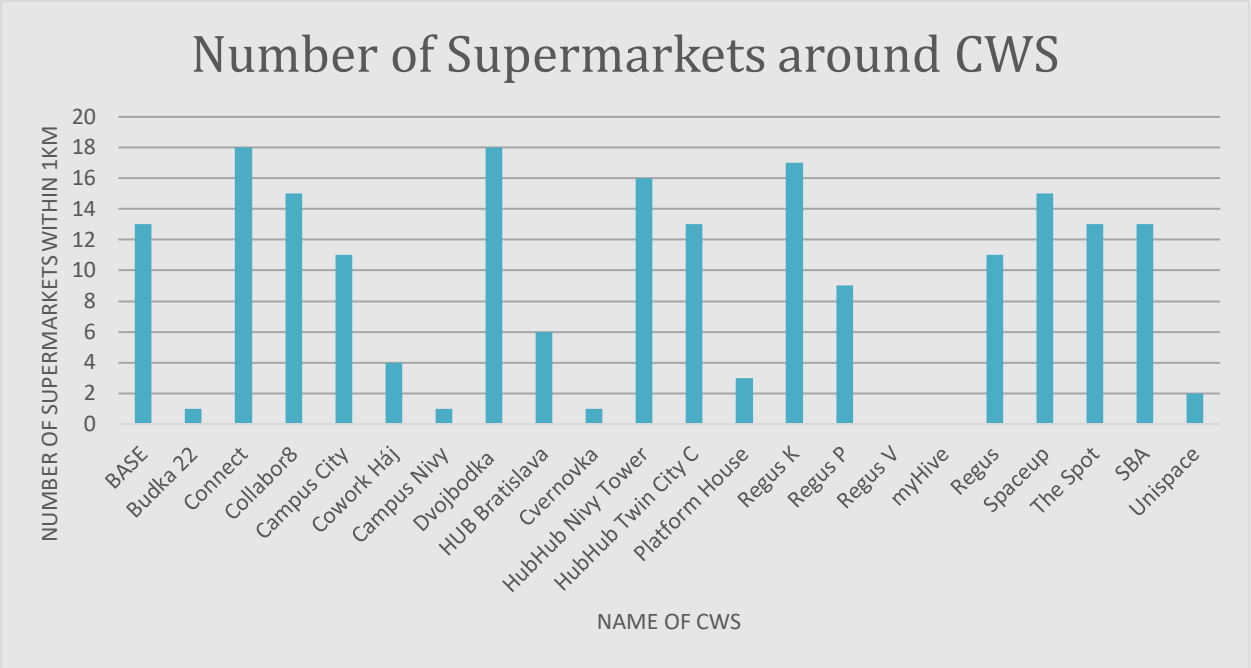


Figure 12: Graph showing the number of supermarkets within 1km radius from coworking space (CWS)

*Source: Created by the author*

Based on the numbers, the differences in access to amenities vary to a large extent from place to place. The users of coworking spaces in the city center can enjoy a larger variety and number of amenities than those outside of the center. These clusters of restaurants, coffee shops, bars, and supermarkets are visually represented in Appendices 4 to 7.

### *Proximity to universities and governmental institutes*

Similarly, as with the aforementioned amenities, universities, and governmental institutions within the buffers can be predominantly found in the city center of Bratislava (Appendix 8 and 9). Throughout all the buffers, the number of both universities and governmental institutions is quite low as seen in Figure 13 while many areas around coworking spaces do not have either of them present. Thus, this analysis does not support the hypothesis that the coworking spaces are near university buildings and/or governmental institutes because it does not apply to most coworking spaces.

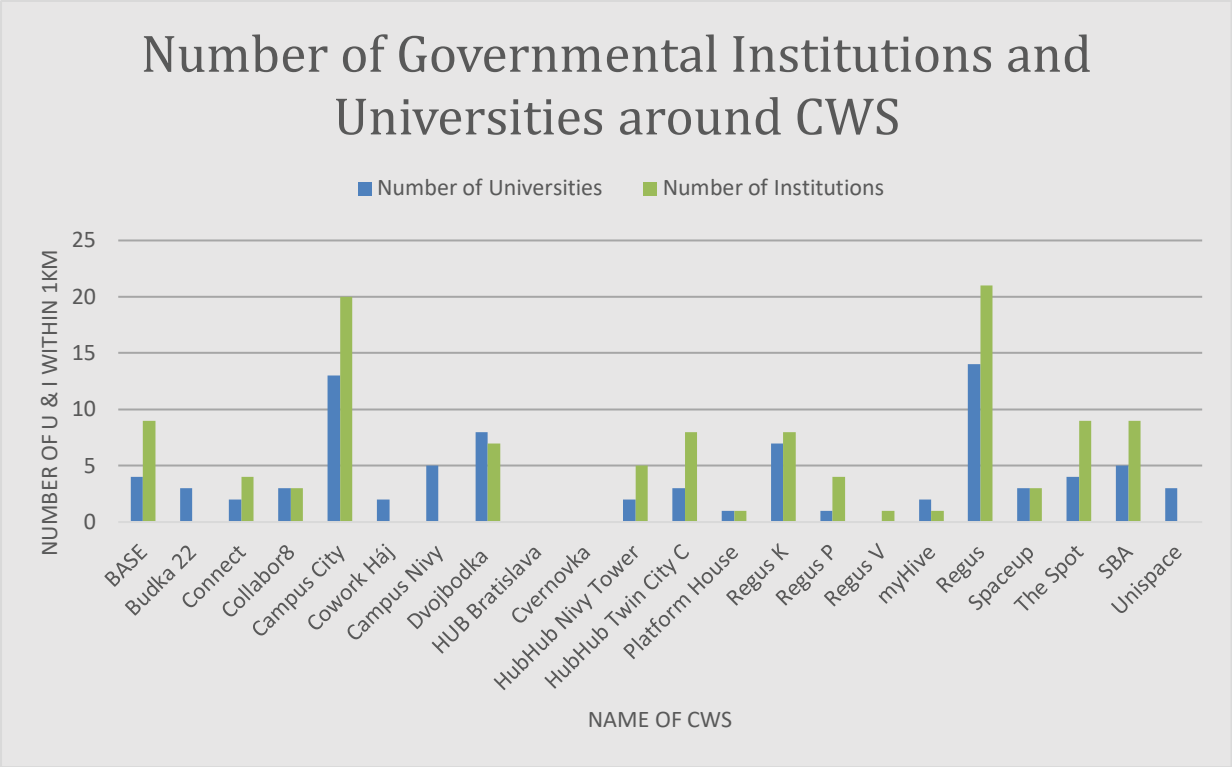


Figure 13: Graph showing the number of governmental institutions and universities within 1km radius from coworking space

*Source: Created by the author*

# Conclusion and Discussion

To answer the main research question about the spatial patterns and characteristics influencing the locations of coworking spaces in Bratislava, we must first reflect on the truthfulness of the five hypotheses presented.

The first hypothesis operated with the assumption that coworking spaces are spatially clustered. Based on the results acquired from the ArcGIS analysis, we can declare that Bratislava's coworking spaces are clustered mostly in the historic city center and its immediate surrounding, while there also exist three other smaller hotspots with few workplaces.

The second hypothesis about the location of coworking spaces in mixed-use areas allowing easier access to urban amenities and resources proved more difficult to analyze. The highly fragmented nature of the territorial plan of Bratislava may be responsible for different results than the academic literature suggests. In Bratislava, 59% of the areas where coworking spaces are located are in civic amenity zones; mixed-use areas and residential zones creating 23% and 18% respectively. Thus, this is not in line with the claim that coworking spaces are located in mixed-use areas.

The third hypothesis about good accessibility to public transport can be considered true, however, the definition of 'good' accessibility creates room for interpretation. What can be proved is the numerical evidence that shows that all coworking spaces have access to public transport stops within 400 meters ranging from 3 to 19 stops per space.

The fourth and fifth hypotheses about access to urban amenities namely restaurants, coffee shops, bars, supermarkets, universities, and governmental institutions proved to vary greatly. Some areas, predominantly those situated in the city center, have plentiful amenities within a 1-kilometer radius but the opposite can be applied to the ones outside of the center. Consequently, there is no trend visible that would suggest that access to all the amenities analyzed is important for the location-placement decision of a coworking space.

To conclude, the spatial patterns and characteristics of the current coworking spaces in Bratislava are their spatial clustering, their easy access to public transport, and partial proximity to restaurants, but also to coffee shops, and bars. The availability of supermarkets and the closeness of governmental institutions and universities cannot be considered as their spatial pattern.

As mentioned before, coworking spaces contribute to positive social change in their local environments because they accommodate and attract specialists and the creative class, therefore, increasing the attractiveness and vibrancy of urban areas. Consequently, the cities should strive for the presence and increase of coworking spaces. To provide some

recommendations for city governments and investors, one must look at the results of this research to identify factors important for the location of coworking space. Firstly, since there is a clear spatial pattern of coworking spaces mainly clustering in the historic city center of Bratislava, it can be predicted that this is a good location for establishing future coworking spaces. Secondly, accessibility to public transport is another visible spatial pattern, thus, new coworking spaces should be located within short distances of bus, train, or tram stops and stations. The proximity of restaurants was detected within a 1-kilometer radius of all coworking spaces; hence, we can conclude they play a role. On the contrary, coffee shops, bars, and supermarkets had a lower presence or none. Because of this, the proximity of some of these amenities should not play a big role in the location decision. Lastly, the vicinity of university buildings and governmental institutions also should not be vital. To summarize, new coworking spaces in Bratislava should be located in the historic city center or the other three hotspots identified, near restaurants and public transport stops.

As with every research, there is always a space for improvement regarding strengthening the research and focusing on more factors that might be influential in answering the research question. If there was more time for conducting this research, factors mentioned in the academic literature such as proximity to parks, gyms, and sports centers could have been added to the analysis. Another factor that will be even more relevant in the future due to the increasing environmental awareness of citizens is the accessibility to bike-sharing stations. A map showing the current distribution of bike-sharing stations in Bratislava already exists, however, due to the nature of the map, it is not possible to conduct any kind of spatial analysis with it as it cannot be inserted into ArcGIS. Additionally, the academic literature suggests that coworking spaces can be found in high-income neighborhoods so it would be interesting to see whether it is also the case of Bratislava. All these factors can be seen as a suggestion for the next research.

The results of this research show that the coworking spaces in the city center of Bratislava provide larger accessibility to urban amenities than those outside of the center. For that reason, it could be beneficial to investigate the popularity of each coworking space and its number of users to derive any conclusion about whether the coworking spaces in the city center are more popular or not. However, the reason for users to choose coworking space can also be price. Due to lower real estate prices outside of the city center, the price of the coworking space membership can be lower in the outskirts and be a significant factor for the users. Hence, there arises an opportunity for further qualitative research that can focus on interviewing coworking space users about the most important factors in their decision-making process while choosing their workplace.

The biggest limitation of this research is the number of coworking spaces, 22 in total. From the statistical point of view, this is the whole population. However, to run any statistical test that would be representative, at least 30 cases are required. For example, creating a

comparison between coworking spaces in Bratislava and other capital cities or the whole Slovak Republic could solve this lack of data.

Another worth-mentioning limitation of this research is the quality of the data, specifically the location and number of restaurants, coffee shops, bars, and supermarkets. All these data were retrieved from the OpenStreetMap which does not always provide the most up-to-date information, however, there was no better data source known to the author. It is possible that some of these amenities no longer exist or there are new ones undetected. Nevertheless, it is unlikely that this creates any significant influence on the analysis because the difference between the available data and reality is suspected to be minimal. Moreover, if an amenity is no longer in existence, the chances that a new one took over are high.

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# Appendices

Appendix 1: Names and addresses of coworking spaces

| Name of coworking space | Address of coworking space |
|---|---|
| BASE | Bottova 6067/1, 811 09, Bratislava I, Bratislava |
| Budka 22 | Búdková 3552/22, 811 04, Bratislava I, Bratislava |
| Campus City | Staromestská 7830/3, 811 03, Bratislava I, Bratislava |
| Campus Nivy | Staré Grunty 205/18, 841 04, Bratislava IV, Bratislava |
| Collabor8 | Ružová dolina, 821 08, Bratislava II, Bratislava |
| Connect | Košická, 821 08, Bratislava II, Bratislava |
| Cowork Háj | Šustekova 2689/5, 851 04, Bratislava V, Bratislava |
| Cvernovka | Račianska 1575/78, 831 02, Bratislava III, Bratislava |
| Dvojbodka | Šoltésovej 2687/3, 811 08, Bratislava I, Bratislava |
| HUB Bratislava | Černyševského 1287/10, 851 01, Bratislava V, Bratislava |
| HubHub Nivy Tower | Mlynské nivy 18890/5, 821 09, Bratislava II, Bratislava |
| HubHub Twin City C | Mlynské nivy 7816/16, 821 09, Bratislava I, Bratislava |
| myHive | Vajnorská, 831 04, Bratislava III, Bratislava |
| Platform House | Sliačska 1212/1, 831 02, Bratislava III, Bratislava |
| Regus | Suché mýto 7045/1, 811 03, Bratislava I, Bratislava |
| Regus K | Karadžičova 7244/8A, 821 08, Bratislava I, Bratislava |
| Regus P | Prievozská 16730/4D, 821 09, Bratislava II, Bratislava |
| Regus V | Vajnorská, 831 04, Bratislava III, Bratislava |
| SBA | Karadžičova 7773/2, 811 09, Bratislava I, Bratislava |
| Spaceup | Záhradnícka 752/95, 821 08, Bratislava II, Bratislava |
| The Spot | Bottova 7939/2A, 811 09, Bratislava I, Bratislava |
| Unispace | Mlynská Dolina, 841 04, Bratislava IV, Bratislava |

*Source: Created by the author*

Appendix 2: Names and addresses of government institutions

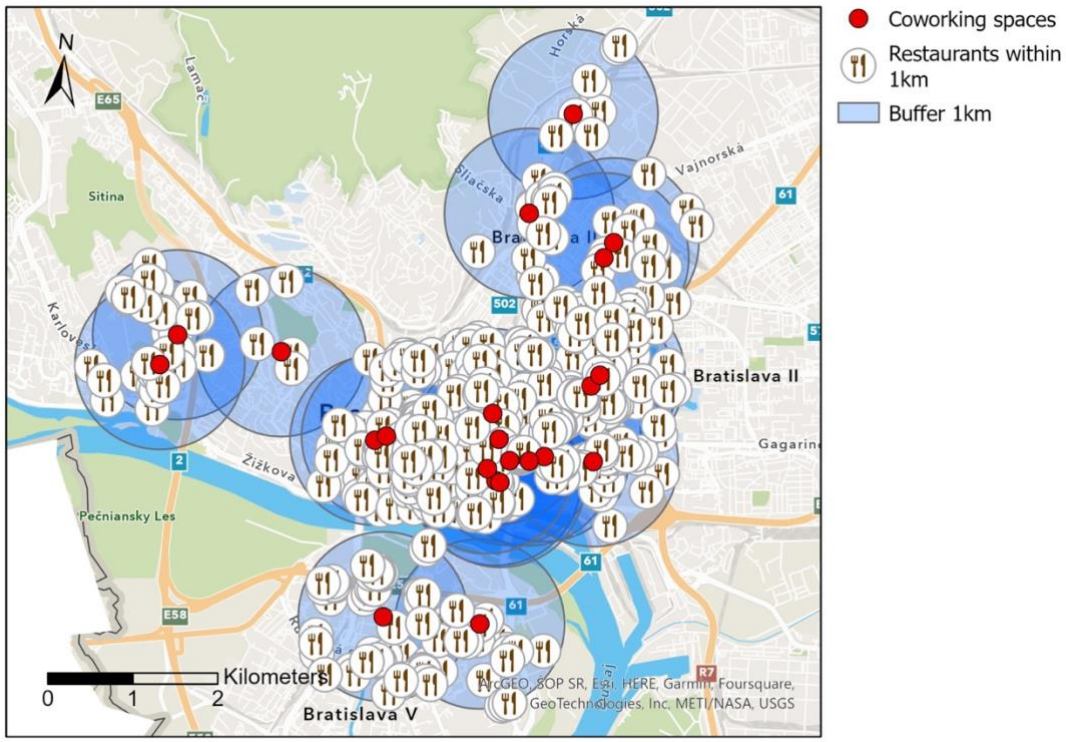
| Name of the institute | Address |
|---|---|
| KANCELÁRIA PREZIDENTA SLOVENSKEJ REPUBLIKY | Štefánikova 2, 810 00 Bratislava |
| NÁRODNÁ RADA SLOVENSKEJ REPUBLIKY | Nám. A. Dubčeka, 812 80 Bratislava |
| ÚRAD VLÁDY SLOVENSKEJ REPUBLIKY | Nám. slobody 1, 813 70 Bratislava |
| GENERÁLNA PROKURATÚRA SR | Štúrova 2, 812 85 Bratislava |
| INŠTITÚT PRE VÝSKUM PRÁCE A RODINY | Župné nám. 5-6, 812 41 Bratislava |
| KANCELÁRIA VEREJNÉHO OCHRANCU PRÁV | Grösslingová 35, 811 09 Bratislava |
| MINISTERSTVO DOPRAVY A VÝSTAVBY SR | Nám. slobody 6, 810 05 Bratislava |
| MINISTERSTVO FINANCIÍ SR | Štefanovičova 5, 817 82 Bratislava |
| MINISTERSTVO HOSPODÁRSTVA SR | Mlynské nivy 44A, 827 15 Bratislava |
| MINISTERSTVO INVESTÍCIÍ, REGIONÁLNEHO ROZVOJA A INFORMATIZÁCIE SLOVENSKEJ REPUBLIKY | Pribinova 25, 811 09 Bratislava |
| MINISTERSTVO KULTÚRY SR | Nám. SNP 33, 813 31 Bratislava |
| MINISTERSTVO OBRANY SR | Kutuzovova 8, 832 47 Bratislava |
| MINISTERSTVO PÔDOHOSPODÁRSTVA A ROZVOJA VIDIEKA SR | Dobrovičova 12, 812 66 Bratislava |
| MINISTERSTVO PRÁCE, SOC. VECÍ A RODINY SR | Špitálska 4, 816 43 Bratislava |
| MINISTERSTVO ŠKOLSTVA, VEDY, VÝSKUMU A ŠPORTU SR | Stromová 1, 813 30 Bratislava |
| MINISTERSTVO SPRAVODLIVOSTI SR | Župné nám. 13, 813 11 Bratislava |
| MINISTERSTVO VNÚTRA SR | Pribinova 2, 812 72 Bratislava |
| MINISTERSTVO ZAHRANIČNÝCH VECÍ A EURÓPSKYCH ZÁLEŽITOSTÍ SR | Hlboká cesta 2, 833 36 Bratislava |
| MINISTERSTVO ZDRAVOTNÍCTVA SR | Limbova 2, 837 52 Bratislava |
| MINISTERSTVO ŽIVOTNÉHO PROSTREDIA SR | Nám. Ľ.Štúra 1, 812 35 Bratislava |
| NAJVYŠŠÍ KONTROLNÝ ÚRAD SR | Priemyselná 2, 824 73 Bratislava |
| NAJVYŠŠÍ SÚD SLOVENSKEJ REPUBLIKY | Župné námestie 13, 814 90 Bratislava |
| NÁRODNÁ BANKA SLOVENSKA | Imricha Karvaša 1, 813 25 Bratislava |
| NÁRODNÝ BEZPEČNOSTNÝ ÚRAD | Budatínska 30, 851 06 Bratislava |
| PAMIATKOVÝ ÚRAD SR | Cesta na Červený most 6, 814 06 Bratislava |
| PROTIMONOPOLNÝ ÚRAD SR | Drieňová 24, 826 03 Bratislava |
| SLOVENSKÉ DOKUMENTAČNÉ A INFORMAČNÉ STREDISKO SOCIÁLNEJ OCHRANY | Špitálska 6, 812 41 Bratislava |
| SLOVENSKÝ METROLOGICKÝ ÚSTAV | Karloveská 63, 842 55 Bratislava |
| SOCIÁLNA POISŤOVŇA | Ul. 29. augusta 8-10, 813 63 Bratislava |
| SPRÁVA ŠTÁTNYCH HMOTNÝCH REZERV SR | Pražská 29, 812 63 Bratislava |
| ŠTATISTICKÝ ÚRAD SR | Lamačská cesta 3C, 840 05 Bratislava |
| ÚRAD GEODÉZIE, KARTOGRAFIE A KATASTRA SR | Chlumeckého 2, 820 12 Bratislava |
| ÚRAD JADROVÉHO DOZORU | Bajkalská 27, 82007 Bratislava |
| ÚRAD NA OCHRANU OSOBNÝCH ÚDAJOV SR | Hraničná 12, 820 07 Bratislava |
| ÚRAD PRE NORMALIZÁCIU, METROLÓGIU A SKÚŠOBNÍCTVO SR | Štefanovičova 3, 810 05 Bratislava |
| ÚRAD PRE REGULÁCIU ELEKTRONICKÝCH KOMUNIKÁCIÍ A POŠTOVÝCH SLUŽIEB | Továrenská 7, 828 55 Bratislava |
| ÚRAD PRE REGULÁCIU SIEŤOVÝCH ODVETVÍ | Tomášikova 28C, 821 01 Bratislava |
| ÚRAD PRE SLOVÁKOV ŽIJÚCICH V ZAHRANIČÍ | Palisády 29A, 817 80 Bratislava |
| ÚRAD PRE VEREJNÉ OBSTARÁVANIE | Ružová dolina 10, 821 09 Bratislava |
| ÚSTAV PAMÄTI NÁRODA | Námestie SNP 28, 810 00 Bratislava |

*Source: Created by the author*

Appendix 3: Names and addresses of universities

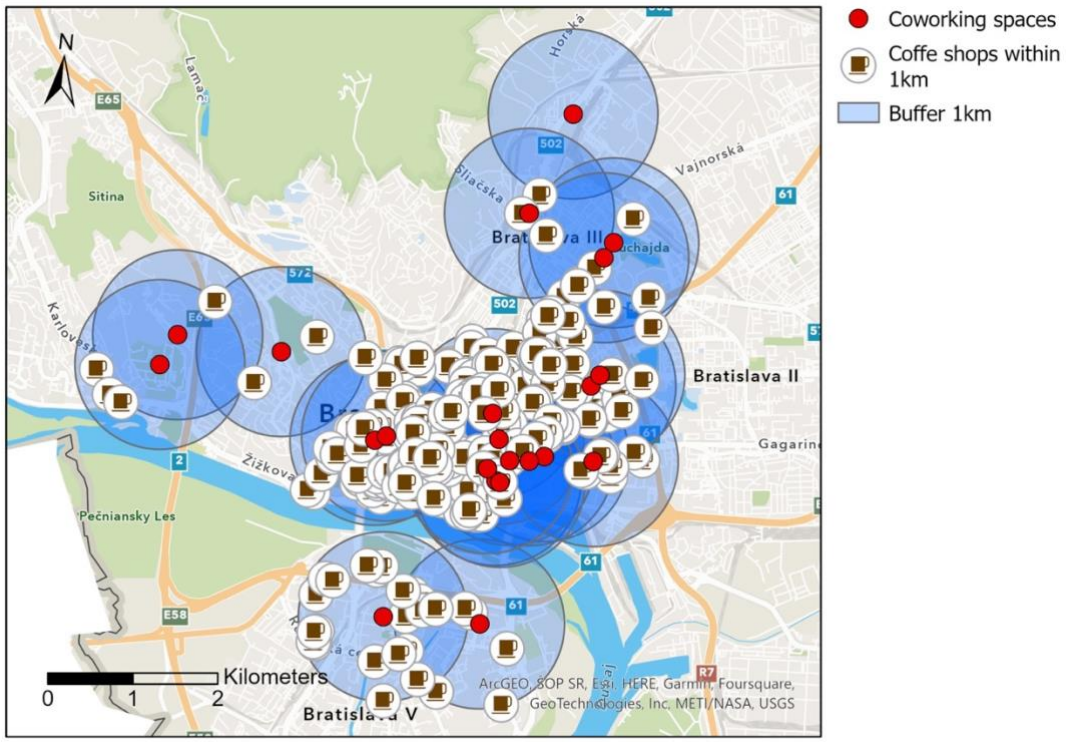
| Name of university | Address |
|---|---|
| Akadémia Policajného zboru v Bratislave | Sklabinská 1, 835 17 Bratislava 35 |
| Bratislavská medzinárodná škola liberálnych štúdií | Grösslingová 53, 811 09 Bratislava |
| Ekonomická univerzita v Bratislave | Dolnozemská cesta 1, 852 35 Bratislava |
| Paneurópska vysoká škola | Tematínska 10, 851 05 Bratislava, Slovakia |
| Paneurópska vysoká škola | Tomášikova 20, 821 02 Bratislava |
| Slovenská technická univerzita v Bratislave | Radlinského 2101/9, 812 37 Bratislava, Slovakia |
| Slovenská technická univerzita v Bratislave | Vazovova 5, 812 43 Bratislava, Slovakia |
| Slovenská technická univerzita v Bratislave | Námestie slobody 17, 812 31 Bratislava, Slovakia |
| Slovenská technická univerzita v Bratislave | Imricha Karvaša, 811 07 Bratislava, Slovakia |
| Slovenská technická univerzita v Bratislave | Ilkovičova 3, 841 04 Bratislava, Slovakia |
| Slovenská technická univerzita v Bratislave | Námestie slobody 19, 812 45 Bratislava, Slovakia |
| Slovenská technická univerzita v Bratislave | Ilkovičova 2, 842 16 Bratislava, Slovakia |
| Slovenská zdravotnícka univerzita v Bratislave | Limbová 12, 833 03 Bratislava |
| Univerzita Komenského v Bratislave | Mlynská dolina, 842 48 Bratislava |
| Univerzita Komenského v Bratislave | Mlynská dolina B-1, 842 15 Bratislava |
| Univerzita Komenského v Bratislave | Bartókova 8, 811 02 Bratislava |
| Univerzita Komenského v Bratislave | Nábrežie arm. gen. L. Svobodu 9, 814 69 Bratislava |
| Univerzita Komenského v Bratislave | Kapitulská 26, 814 58 Bratislava |
| Univerzita Komenského v Bratislave | Račianska 59, 813 34 Bratislava |
| Univerzita Komenského v Bratislave | Špitálska 24, 813 72 Bratislava |
| Univerzita Komenského v Bratislave | Šafárikovo námestie 6, 814 99 Bratislava 1 |
| Univerzita Komenského v Bratislave | Gondova 2, 814 99 Bratislava |
| Univerzita Komenského v Bratislave | Odbojárov 10, 820 05 Bratislava |
| Univerzita Komenského v Bratislave | Odbojárov 10, 832 32 Bratislava |
| Univerzita Komenského v Bratislave | Mlynské luhy 4, 821 05 Bratislava |
| Vysoká škola ekonómie a manažmentu verejnej správy v Bratislave | Furdekova 16, 851 04 Bratislava 5 |
| Vysoká škola manažmentu | Panónska cesta 17, 851 04 Bratislava |
| Vysoká škola múzických umení v Bratislave | Ventúrska 3, 813 01 Bratislava |
| Vysoká škola múzických umení v Bratislave | Ventúrska 268, 811 01 Bratislava, Slovakia |
| Vysoká škola múzických umení v Bratislave | Svoradova 2, 811 03 Bratislava, Slovakia |
| Vysoká škola múzických umení v Bratislave | Zochova 751/1, 811 03 Bratislava, Slovakia |
| Vysoká škola výtvarných umení v Bratislave | Hviezdoslavovo námestie 18, 814 37 Bratislava, Slovakia |
| Vysoká škola výtvarných umení v Bratislave | Drotárska 44, 811 02 Bratislava, Slovakia |
| Vysoká škola výtvarných umení v Bratislave | Koceľova 23, 821 08 Bratislava, Slovakia |
| Vysoká škola zdravotníctva a sociálnej práce sv. Alžbety v Bratislave | Námestie 1. mája 1, 810 00 Bratislava |

*Source: Created by the author*



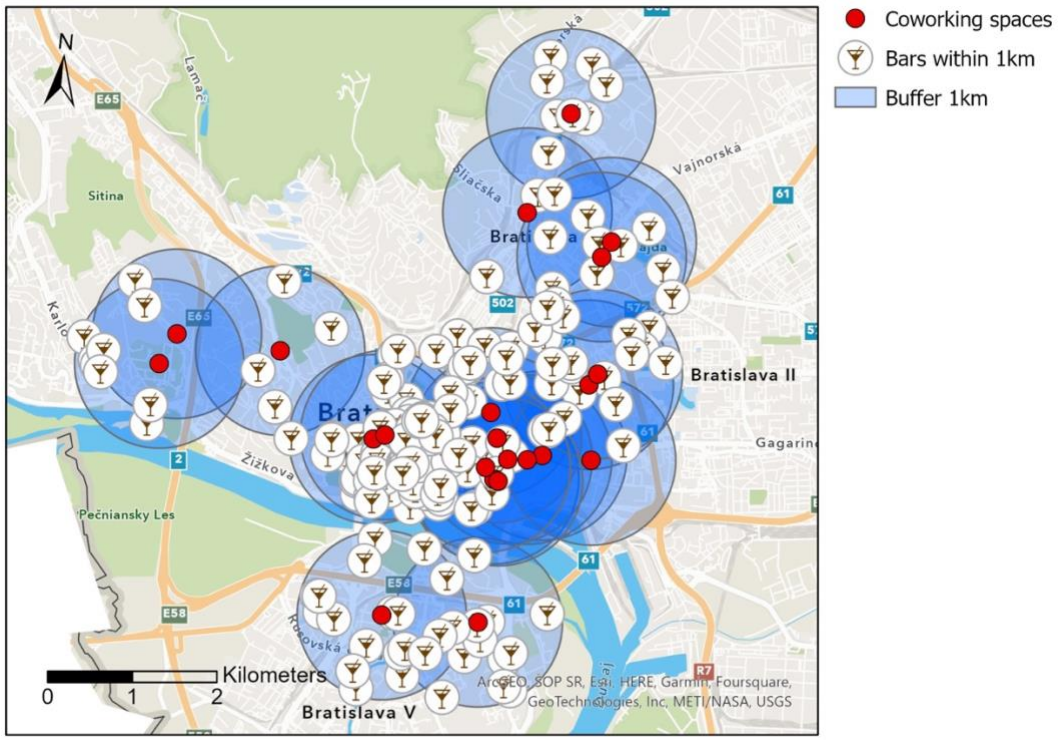

Appendix 4: Map of restaurants within 1km radius from coworking spaces

*Source: Created by the author*



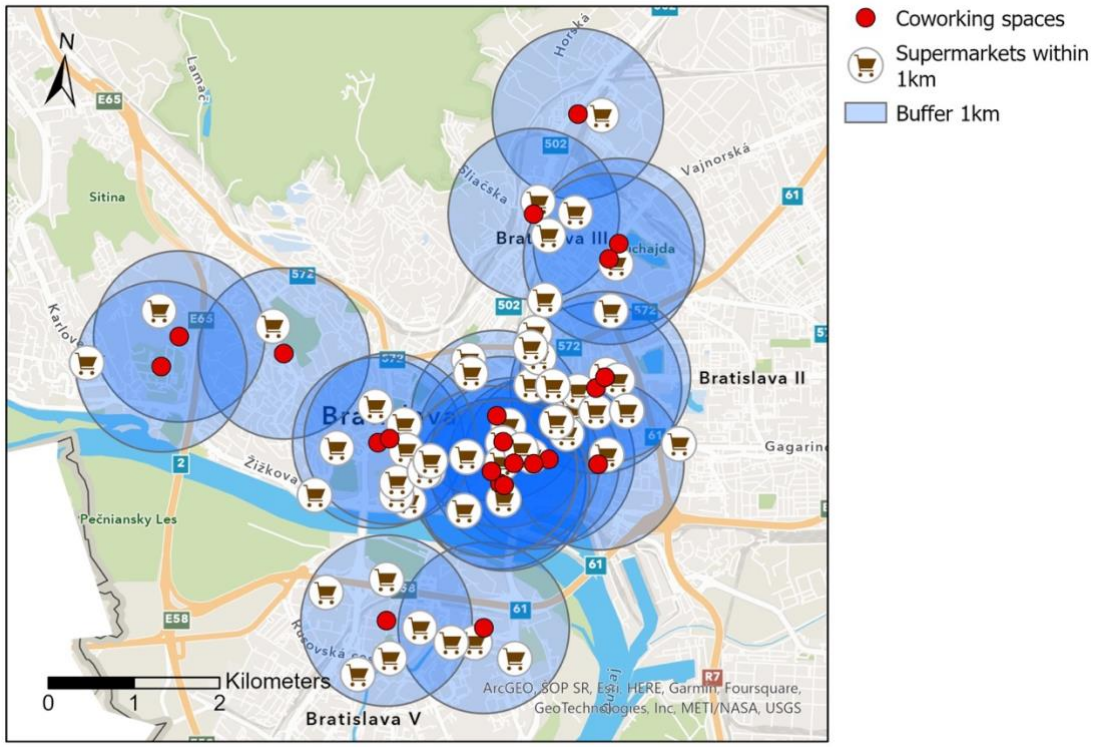

Appendix 5: Map of coffee shops within 1km radius from coworking spaces

*Source: Created by the author*



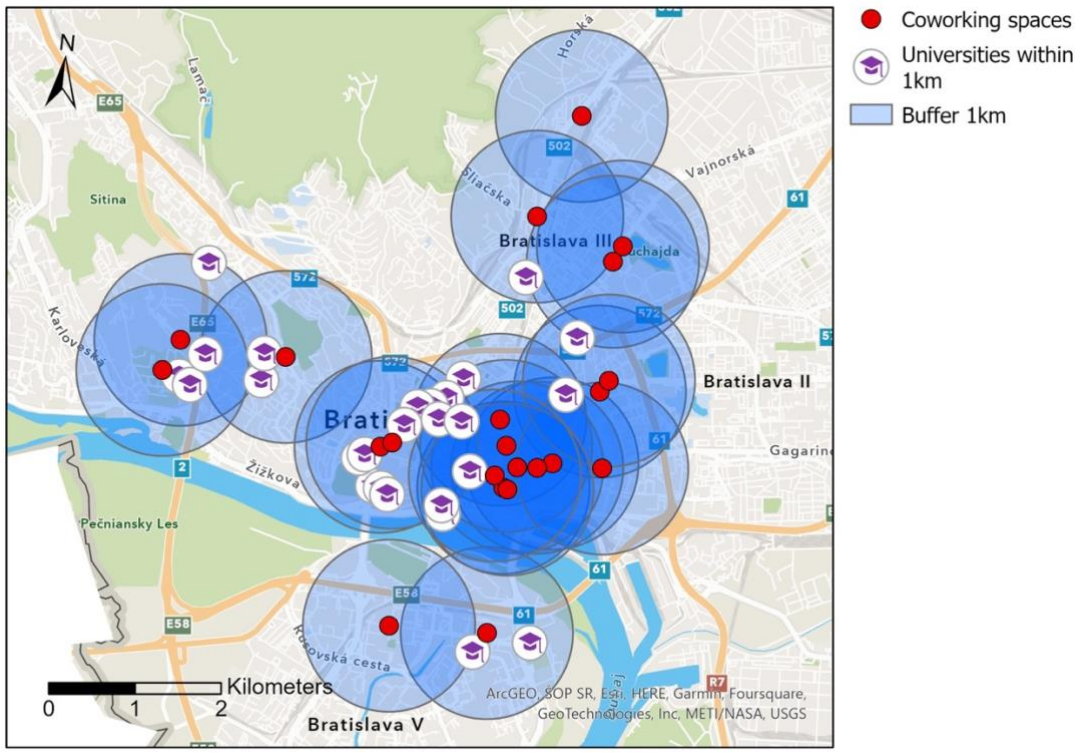

Appendix 6: Map of bars within 1km radius from coworking spaces

*Source: Created by the author*



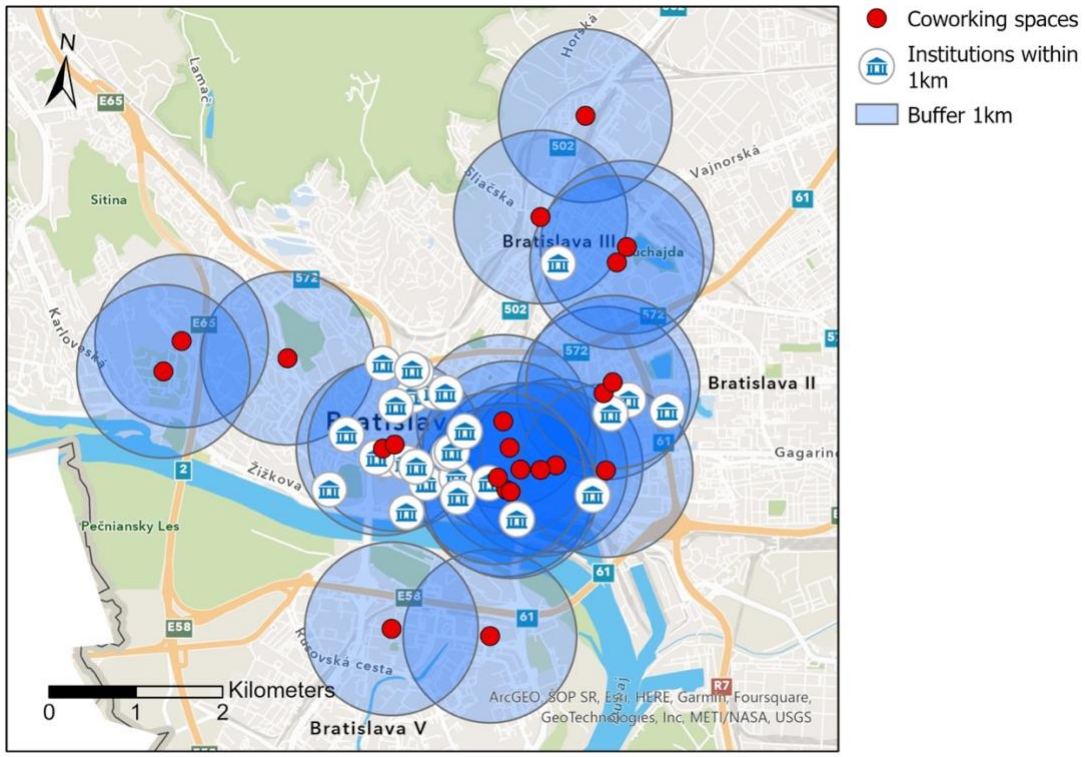

Appendix 7: Map of supermarkets within 1km radius from coworking spaces

*Source: Created by the author*




Appendix 8: Map of universities within 1km radius from coworking spaces

*Source:* Created by the author




Appendix 9: Map of governmental institutions within 1km radius from coworking spaces

*Source: Created by the author*