Assessing Public Sentiments in Post-Urban Regeneration: A Location-based Analysis of the Karaköy Salıpazarı, İstanbul

Selin Aslan, Fatih Terzi
Istanbul Technical University
aslansel19@itu.edu.tr, terzifati@itu.edu.tr

Abstract

The historical Karaköy, Salıpazarı District in İstanbul, with its rich urban heritage, has undergone significant transformation catalyzed by the implementation of the Galataport urban regeneration project. This urban endeavor, while aiming to revitalize the waterfront area and enhance the connectivity, has prompted concerns about its impact on the social, physical, daily life practices and the overall identity of locale. Focusing on the social context of urban regeneration, the study aims to discover public attachment patterns in Karaköy Salıpazarı district post urban regeneration

Utilizing Location-Based Social Media data, the study conducted sentiment analysis based on Google Maps reviews published in the last year. The data underwent Neuro Linguistic Programing (NLP) process within Microsoft Excel Azure Add-in, and subsequently mapped by employing spatial interpolation methods in ArcGIS. In conjunction with the hot spot analysis of overall ratings and review density heat map, the study claimed that the regeneration efforts in area do not fully align with the needs of city dwellers.

KeyWords: Urban Regeneration, Sentiment Analysis, GIS, Istanbul

1. Introduction

Urban regeneration initiatives worldwide have become prominent in academic discourse, not only due to their impact on physical structure of cities but also with their social contributions to daily life experiences of urban habitants. To achieve successful urban regeneration endeavors, scholars emphasize the imperative of considering social aspect, and suggest that such projects should aim to integrate the city and its dwellers by taking daily life dynamics of local residents into account (Karslı,2015). In the cases where the social dimension is not adequately addressed, urban areas and their component parts experience the emergence of new social memory and identity pressures within the region. This circumstance is highly observable with the tendency of contemporary urban regeneration practices to impose popular culture on urban life, particularly in areas of historical significance (Creve and Beaverstock, 1998).

Although the social integration was highlighted as one of the primary aspects in urban regeneration (dos Santos Figueiredo et. al., 2022; Heat et. al., 2017; De Rosa and Di Palma, 2013), it might be challenging to make definitive assumptions regarding social effects of regeneration projects. Herein, revealing the existing community sentiment patterns can serve as a valuable social-spatial source to observe symbiotic relationship between human and their environment (Yang et. al., 2022).

The challenge of understanding social patterns of community necessitates use of advanced methodologies. In this regard, Geographic Information Systems (GIS) emerge as a quite beneficial tool for socio-spatial analyses of specific districts. Particularly, utilizing public sentiment analysis based on location-based social media data in ArcGIS environment enables to comprehend social spatial dynamics of specific district.

Within this theoretical framework, the study approaches the social dimension of urban regeneration through the case of Karaköy Salıpazarı district. The intricate urban regeneration process of the area and implementation of the Galataport Complex within the historical

landscape of the Karaköy area has recently raised criticism and became one of the central subjects in urban research. While several researchers and urban practitioners criticize the project for its perceived deficiency in social integrity and responsiveness to the historical characteristics of the site (Korkut and Nalbantoğlu, 2023; Karslı, 2015; Köksal, 2012; Durmuş, 2009), the current literature fall behind to provide a perceptible claim about the socio-spatial transformation experienced by the site. The stated gap in the literature makes it crucial to investigate transformative power of Galataport urban regeneration project on the socio-cultural fabric of the locale as well as its associated reflection on public sentiments.

Following this objective, the study investigates public sentiments arising from post-urban regeneration in the Karaköy Salıpazarı area. By implementing sentiment analysis techniques applied to Google Maps data via Geographic Information Systems, the study not only achieves to discern the accuracy of criticized aspects of Galataport Complex, but also reveals social engagement patterns of the public in the context of post-urban regeneration. In the conclusion part, the reader is invited to the discussion about the integration of urban planning tools into the urban regeneration process that could provide successful impacts on public sentiments and enhance the level of social integration.

2. Urban Regeneration Dynamics and Public Sentiments

2.1. Urban Regeneration of Historical Landscape

Urban regeneration is a multifaceted endeavor requiring theoretical insight and solid strategies encompassing economic, physical, environmental and social issues regarding urban environment (Chen et. al., 2012, cited in Lak et. al., 2020;). For many scholars, successful urban regeneration projects distinguish themselves by transcending mere physical transformation and advocating for a holistic approach including diverse dimensions (Güzey, 2009; Turok, 2004; Atkinson, 2004; Roberts and Sykes, 2004). In particular, the importance of social dimension is underscored

as such projects serve to public, who has no chance to live without them. Considering the social aspect emerges as an integral part of urban regeneration, only could be achieved by improving the quality of life and social relations, improving the access to public services, decreasing the crime rates, overcoming social exclusion and so on (Güzey, 2009).

Contemporary urban regeneration initiatives, as criticized by several researchers, associate success only with an added income, and exhibit noticeable deficiency in addressing these social concerns (dos Santos Figueiredo et. al., 2022; Boussa, 2017; De Rosa and Di Palma, 2013). This critique becomes particularly notable in the context of historical landscapes, where urban regeneration initiatives display a complex dilemma. Justifying public interest by recovering architectural heritage (Couch et. al., 2002) and representing new economy and consumption demands of the middle-high classes (Zukin, 1998), contemporary implications often cause consequential challenges in strategic urban areas such as displacement of existing populations (Heat et. al., 2017), erasure of city identity (Boussa, 2017), heightened spatial segregation (Marcuse, 1998).

To eliminate this consequences, it is deemed important to elucidate the social psychological processes involved in the establishment of social cohesion, and impact of these processes on public engagement patterns (Heat, 2017). While solid definition of 'social' element in the urban planning and regeneration processes remains challenging (Chatfield and Reddick, 2016), improvements in technology and the prominence of social media offer promising paths for the observation of evolving social patterns.

2.2. User-Generated Data in Understanding Urban Dynamics

In the contemporary era of Information and Communication Technologies (IoT), widespread technology, and the rise of social media usage facilitate cities to be contributed both by human and machine intelligence. This assembly not only enables public to actively contribute and receive information from the urban space but also encourages a socially informed urban environment (Crooks et. al., 2016). In this regard, the integration of Location-Based Social Networking (LBSN) data in urban studies plays a crucial role in understanding social dynamics of urban landscapes. The imperative of this integration lies in its potential to reveal the values of the public in relation with their location (Ilieya and McPhearson, 2018). According to Crooks et. al. (2016), urban research is bound to explore the relationship between physical spaces, perceptible spaces and the linked spaces through the interconnected nature of social media. Several researchers contributed urban research utilizing from this type of data in diverse topics covering urban mobility (Mohammadbagherzadeh and Terzi, 2022; Oven, 2017), public health, economic development (Hong, 2015), urban green spaces (Chen et. al., 2022; Ghahramani et. al., 2021; Kovacs-Györi et. al., 2018), urban activity patterns (Üsküplü et. al., 2019; Agryzkov et. al., 2016) and human environment relationships (Huang et. al., 2021; Hasnat and Hasan, 2018; Marine-Roig and Clave, 2015).

LBSN data, a product of millions of users worldwide (Hu et. al., 2015) constitutes a valuable resource in contemporary academic research, representing user's voluntarily published perceptions, interests, needs, and behaviors specific to urban locations (Estrada & Nolasco-Cirugeda, 2019). Collection of this type of data is facilitated through three types of social media platforms: Microblogs (i. e., Twitter, Facebook), Photo/video sharing (i.e., Flickr, Instagram, Youtube), and Point of Interest (POI) platforms (i. e., Open Street Map, Foursquare, Google Places) (McKitick et al., 2023). Variety of Location-Based Social Networking platforms provide researchers with a comprehensive understanding of urban dynamics, behaviors and social interactions.

2.3. Public Sentiment Analysis

For a comprehensive exploration into the interconnected psychological relationship between individuals and their environment, Location-Based Social Network data presents valuable opportunities. In particular, the investigation of community attachment patterns to specific urban areas can be accomplished through the utilization of sentiment analysis, which asses the individuals' emotional states according to their written statements in social platforms (Lopez-Mosquera and Sanchez, 2011). The analytical process requires the application of Neuro Linguistic Programming (NLP) methods, categorizing individuals' statements as indicatives of positive, neutral or negative emotions.

In the context of urban research, sentiment analysis proves a valuable social-spatial reference dataset in monitoring and investigating human-environment relationship in various aspects. Firstly, providing a broad social layer to smart city governance, it contributes a shift from a single government-centric paradigm to a data driven, multi-stakeholder mode (Meijer & Bolivar, 2016). Moreover, sentiment analysis is seen beneficial for disclosing the local daily life and embedded social and cultural context that were usually overlooked by authorized official data. (Yang et. al., 2022). In these ways, the analysis is considered as an active instrument in terms of urban governance, by monitoring public response, evaluating urban facilities and well-being, and promoting smart city approach (Yang et.al., 2022).

Several researchers have contributed urban research analyzing public sentiment patterns of distinctive case areas. By utilizing the sentiment analysis, these scholars provided valuable

information to the literature about broad range of topics covering urban identity (Hang, 2015), activity patterns (Yang & Dvale, 2021; Üsküplü et. al., 2021), social spatial interactions (Yang et. al., 2022; Chen et. al., 2022; Gyori et. al., 2018; Stojanarski et. al., 2016), urban street networks (Agyzkoo et. al., 2016, 2017), and green spaces (Kovacs-Gyori, 2018). The source of the LBSN data is mainly observed as Twitter platform within the studies investigating social spatial interactions while Foursquare platform is used in research focusing on urban identity, urban street network and urban activity patterns (Table 1). However, new data sharing policies of these platforms highly restricted the LBSN data based research in current situation.

Table 1. Contribution to Public Sentiment Research in Urban Environment

Author	Year	Data Source	Research Context	Methodology /Visualization
Hang	2015	Foursquare	Urban Identity	Sentiment HeatMap
Stojanarski et. al.	2016	Twitter	Socio-Spatial Interactions	Sentiment HeatMap
Agryzkoo et. al.	2016	Foursquare/ Twitter	Urban Street Network	Network Analysis
	2017	Foursquare	Urban Street Network	Network Analysis
Kovacs-Gyori et. al.	2018	Twitter/ OpenStreetMap	Urban Green Space	Spatial Distribution/ Natural Breaks
Gyori et. al.	2018	Twitter	Socio-Spatial Interactions	Hot Spot Analysis
Üsküplü et. al.,	2020	Foursquare	Urban Activity Pattern	Hotspot Analysis/ Spatial IDW
Yang & Dvale	2021	Foursquare	Urban Activity Pattern	Network Analysis
Chen et. al.	2022	Twitter	Socio-Spatial Interactions	Spatial Distribution/ Natural Breaks
Yang et. al.	2022	Twitter	Socio-Spatial Interactions	Spatial Distribution/ Average Density

Specific to the context of research, these studies conducted various methodologies such as Hot Spot Analysis, Network Analysis, Spatial Distribution, Spatial Interpolation and Sentiment Heat Map techniques utilized in ArcGIS environment. To identify the clustering of positive and negative sentiments, Hot Spot Analysis and Spatial Interpolation methodologies are highlighted in public sentiment studies.

2.4. The Study Area

The study area is located in the southern part of Beyoğlu, one of the crowded commercial districts of Istanbul (Figure 1). This area particularly is considered as a significant part of the city, characterized by a mixed used of opportunities within its historical fabric. Karaköy Salıpazarı district, the focus area of the study, represents the modern and bohemian characteristics inherent to the city of Istanbul.

Figure 1. Location of the Study Area

2.4.1. Historical Development

Due to its strategic location, the Karaköy area has functioned as a port center with commercial characteristics since early ages. Following the 19th century, numerous banking headquarters and large companies started to be located in the district. Over time, Karaköy gained the characteristics of a city center, accommodating financial, commercial, and transport facilities (Karslı, 2019).

Physical and social changes in the area has started in 1950s, prompted by new zoning plans suggesting the construction of higher buildings and larger roads. Consequently, the historical landscape of the area underwent inevitable disruptions due to new road arrangements and construction activities (Ocakçı & Tepeli, 2017). Following the 1980s, the relocation of banking headquarters and large scale companies to the new Cetral Business District (CBD) of Istanbul, Zincirlikuyu-Maslak area. In this way, the area became a secondary center, losing its commercial significance. Also, the introduction of inappropriate functions and workshops catalyzed extensive changes in both social and physical landscape of the area (Korkut & Nalbantoğlu, 2023; Karslı, 2015).

2.4.2. Implementation of Galataport Complex

The strategic location of the Karaköy Salıpazarı area and its historical texture have given not only a commercial characteristic to it, but also substantial potential as a touristic attraction. Inevitably, tourist attraction to the area hasincreased and overlapped with daily lives of habitants (Korkut & Nalbantoğlu, 2023). Catalyzed by the tourist attraction as well as existence of abandoned historical buildings, Galataport urban regeneration project has been suggested in the area. Covering the massive land within the historical fabric of Karaköy, the project is considered as a cruise port initiative aimed at boosting public space through mixed used development.

Started in 2015, construction of the Galataport urban regeneration project has been driven by multifaceted set of objectives. These include the transformation of the area into a cruise port meeting with global standards, the opening access to the long-closed coastal strip, the enhancement of visitor experience, and the preservation of the historical port's significance (Galataport Istanbul, n.d.). However, during and after the construction, the project has been subject of many criticisms, mainly focusing on the social spatial segregation that the project causes in the area. According to Korkut and Nalbantoğlu (2023), the luxurious commercial businesses and profit-oriented functions suggested in the project only serve to attract tourists' fancy, rather than integrating with the needs of city dwellers. Consequently, the attraction of a

new socio-economical profile has let the disruption of social integrity with the other areas nearby, particularly social flow with Kabataş area is stressed. Furthermore, several scholars criticize the massive scale of the project as it destroys the historical characteristics of the city, creating a barrier between sea and the urban area (Karslı, 2015; Köksal, 2012; Durmuş, 2009).

3. Methodology

Using the location-based Google Maps data, a case study approach is adopted to inquire subtle dynamics of urban regeneration within the Karaköy Salıpazarı district, and provide a comprehensive understanding about public sentiment patterns (Figure 2).

Figure 2. Research Flowchart

3.1. Data Collection

The main evaluation of the study relies on location-based data derived from Google Maps. Google Maps data is considered as a highly convenient source for the research since it enables users to rate places and share associative reviews. The places in obtained data covers wide range of functions (i.e., administrative, commercial, cultural, financial, service activities, food sector, health and sport facilities, religious buildings and so on) as well as point of interests (open spaces, parks, viewpoints, nodes and so on).

Data is obtained through Google Maps' Application Programming Interface (API). However, in this step, the research faced with a limitation imposed by data sharing policy of Google maps, which restricted retrieving data to maximum of 60 venues per one search. Therefore, the study area which occupies land area of approximately 31 hectares, was subdivided into 32 circles with varying radius ranging from 30 to 100 units (Figure 3). For an inclusive outcome, places that are not covered in specified circles are detected manually and added to the dataset. The result is acquired as a csv file, which includes attributes of place ID, google ID, business type (with 5 keywords), ratings, total number of ratings, longitude and latitude of total 1223 venue points.

In the second step, Google Maps reviews of each venue between the time interval from January 1, 2023, 00.01, to December 23, 2023, 00.01, is acquired by utilizing a data scraping platform, specifically outscraper.com. Obtained csv file consists of 2856 text reviews, and their corresponding ratings, place ID attributes.

Figure 3. Exact Locations of Circles for API Search (created by author using mapdevelopers.com platform)

Lastly, sentiment analysis is performed on the text reviews associated with places through Microsoft Excel Azure Machine Learning add-in due to its recognized effectiveness in Neuro Linguistic Programming (NLP) tasks (Peslak, 2018). As a result, processed data along with sentiment level (negative, neutral, positive) and sentiment score (0-0.45: negative, 0.45-0.55: neutral, 0.55-1: positive) attributes is exported as csv file.

3.2. Data Evaluation

Collected data has undergone through two primary analyses and was mapped using ArcGIS Pro. Firstly, Hotspot Analysis was applied to aggregated ratings of venue points, to identify clusters with both high and low popularity. Secondly, in order to identify sentiment clusters, Spatial Interpolation with Inverse Distance Weighting (IDW) was implemented on the sentiment scores corresponding to respective venues. For a comparative analysis, the count of reviews was visually represented using a heat map technique within ArcGIS Pro environment.

4. Results and Discussion

4.1. Spatial Distribution of Venues

The LBSN data obtained from Google Maps comprises 1223 venues within the borders of the Karaköy Salıpazarı district. The predominant concentration of venues is observed in the southwestern region, near the port side, while the northeastern part, where the Galataport Complex is located, displays a sparse distribution of venues (Figure 4).

The study area encompasses a diverse range of urban functions. Since Location-based Google Maps data classifies function of each venue with five keywords, the determination of utilities are determined based on the first keyword representing the dominant use of respective venue. The functional composition of the area comprises administrative, commercial, cultural, educational, financial, food-related, health, religious, and sports facilities as well as interaction/attraction points (Figure 5).

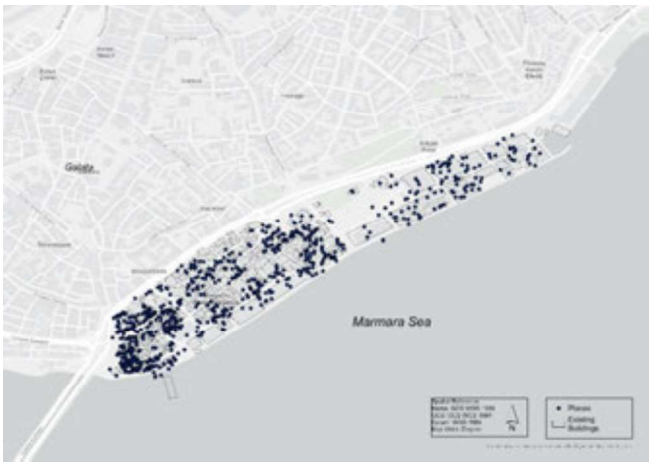

Figure 4. Distribution of Venues (created by author using ArcGIS Pro)

Figure 5. Building Functions (created by author using ArcGIS Pro)

4.2. Public Attachment Patterns

Cluster and hotspot characteristics of footprints and trends were analyzed as an initial step in the investigation of community attachment in the area. To achieve this, Getis-Ord Gİ* analyses were performed based on the attribute value of overall ratings of the venues. The results of the hot spots analyses revealed two notable clusters within the case area. A significant cold spot emerged near the portside, around Rıhtım Avenue, where food-based, financial and administrative functions are evidently concentrated. Adjacent to this cold spot, around Necatibey Avenue on the northern side, a distinct hot spot cluster was observed. This hot spot district is predominantly characterized by commercial and food-based venues, as well as nodes and interaction/attraction points such as viewpoints. In addition to these two clusters, the western part of the area displays several small hot spot clusters distributed across diverse districts (Figure 6).

Hot spot analyses provided a significant outcome, revealing the small cold spot clusters within the eastern part of the area, coinciding with the focus on the inquiry, Galataport Complex. This finding leads to the inference that Galataport area reflects a clustered pattern characterized by lower overall ratings, indicating a concentration of venues with lower satisfaction levels.

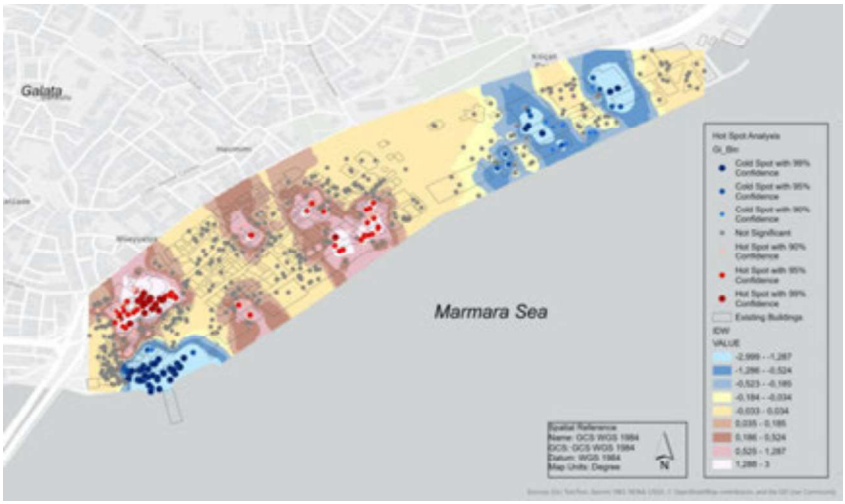

Figure 6. HotSpot Analysis and Spatial Interpolation of Venue Ratings (created by author using ArcGIS Pro)

Secondly, sentiment scores of venues were calculated in Microsoft Excel Azure Add-in, based on Google Maps reviews published in time interval of 1st January 1 am and 20th December 1 am., 2023. To see the distribution of positive and negative sentiments, Spatial Interpolation with Inverse Distance Weighting (IDW) was implemented on the sentiment scores corresponding to respective venues.

The analysis showed an interesting result, indicating a presence of positive sentiment cluster near the portside. This location intersects with the significant cold spot cluster regarding venue ratings, observed in the previous analyses. Although it is not possible to make a definitive inference, this result suggests a potential shift in public attachment patterns to this area in recent years (Figure 7).

Concerning the area where Galataport Complex is located, public sentiments showed a negative-neutral tendency, in parallel with the formations of small cold spot clusters in the area. For further investigation, the study is elaborated to comprehensive comparison of public sentiment distribution and density of the reviews, utilizing spatial interpolation techniques based on number of reviews in respective venues (Figure 8).

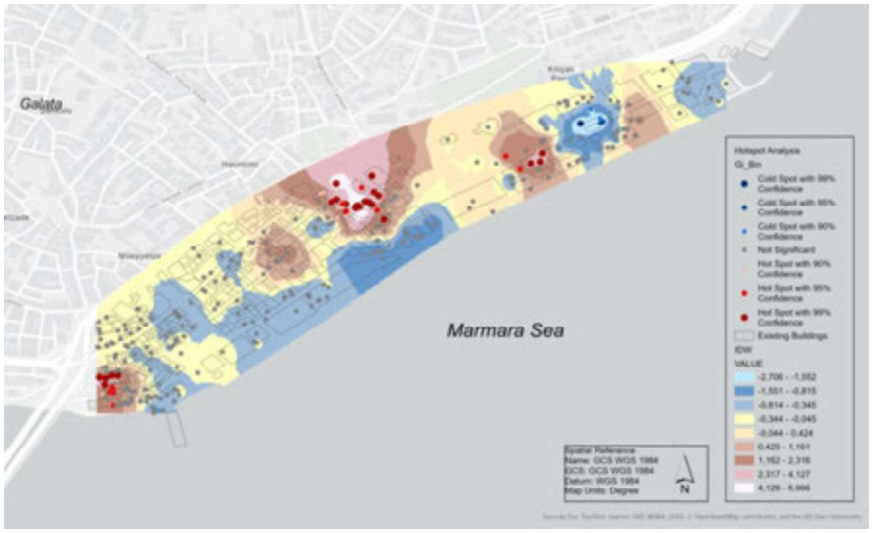

Figure 7. Hotspot Analysis and Spatial Interpolation of Public Sentiments with (created by author using ArcGIS Pro)

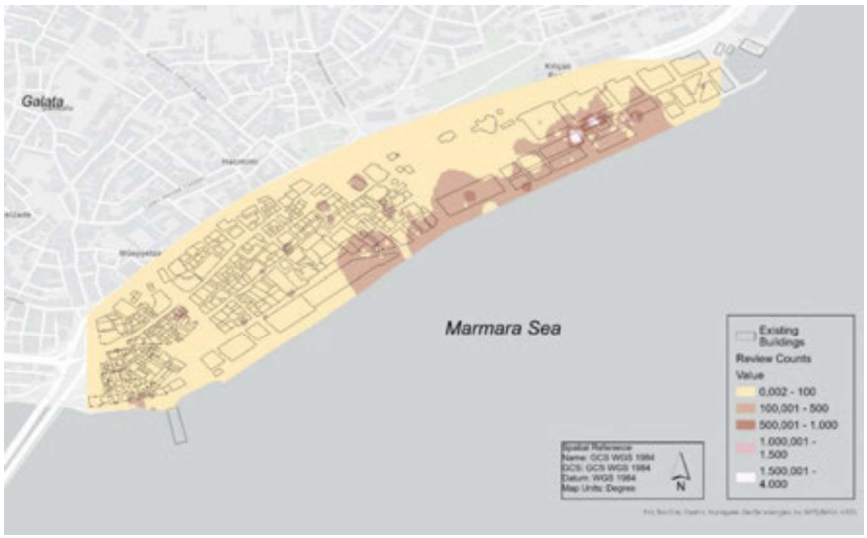

Figure 8. Review Density Spatial Interpolation Map (created by author using ArcGIS Pro)

The results highlighted that, in Galataport Area, where negative sentiment clustering is evident, density of reviews published in recent year tends to be in the highest degree. Therefore, the study revealed that the Galataport area not only reflects the negative public attachment patterns, but also indicates a strong prevalence of negative sentiments within the community, suggesting a sense of detachment from this area.

5. Conclusion

The study utilized spatial sentiment analysis to observe the public attachment patterns related to the Karaköy Salıpzarı area, which has undergone the Galataport urban regeneration initiative in recent years. The primary focus of the study revolves around substantial criticism directed at the project within the context of social integrity. The source of the analyses was Location-based Social Media (LBSN) data derived from Google Maps platform, as it enables users to rate places and share associative reviews.

During the data collection phase, the study faced with several limitations. While retrieving Google Maps data, the study was restricted by new data sharing policy of Google Maps, allowing to scrape only limited number of reviews linked to the venues. Consequently, the study utilized data scraping platforms, namely outscraper.com. Additionally, during sentiment analysis of obtained reviews, another limitation arose by Natural Language Processing (NLP) tool within Microsoft Excel's Azure Add-in. This tool only computes sentiments for text reviews written in Latin alphabet, resulting in the exclusion of numerous reviews in languages using different alphabets.

The study has contributed urban literature by evaluating sentiments of post urban regeneration in Karaköy Salıpazarı area. The primary claim of the research indicates that, even Galataport Complex has a popularity with a substantial number of reviews over the past year, public sentiments tend to be in low-moderate level. This result aligns with the criticism about the project, suggesting that the regeneration efforts in area do not fully integrate with the needs of city dwellers (Korkut&Nalbantoğlu, 2023; Karslı, 2015; Köksal, 2012; Durmuş, 2009). Highlighted with this outcome, the study underscores the significance of the social dimension in the urban regeneration process, revealing the negative reflections on public settlements patterns in instances where its realization proves elusive. In navigating complex landscape of urban regeneration, and for fostering inclusive and resilient urban environments, the study recommends the adoption of a comprehensive approach in future planning endeavors.

For further investigations, it is highly suggested to inquire about the reasons of negative sentiments and cold spot clustering within the Galataport Complex. This investigation might require detailed content analysis of text reviews retrieved from Location-based Social Media (LBSN) platforms.

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