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GIS Analysis of Spatial Patterns of Call Center Industry in Tirana, Albania

[1]*Enkela Begu, [2]Albana Kosovrasti and [3]Sonila Papathimiu
[1]University of Tirana, [2]University of Tirana and [3]University of Tirana
[1]enkela.begu@unitir.edu.al,[2]albana.kosovrasti@unitir.edu.al and [3]sonila.papathimiu@unitir.edu.al

Abstract: *The concept of Call Centers emerged in 1908 in United States, enabling varied marketing strategies facilitated by telecommunication. By the 1960s, various companies were utilizing extensive telephone campaigns to reach potential customers, demonstrating the evolving role of telecommunication in business operations. Recently, technological advancements in computing and telecommunications have spurred significant growth in Call Centers globally, including Albania, which has witnessed an increase in Call Centers, initiated by Intercom Data Service in 2005, with 20 employees. Currently, the number of Call Centers in Albania exceeds 70, employing nearly 4000 individuals, mostly in Tirana and a few in other towns. This study emphasizes the application of Geographic Information Systems (GIS) in analyzing the locational factors affecting the distribution of Call Centers, particularly in Tirana. The integration of GIS not only facilitates an understanding of Call Center proliferation but also aids in mapping demographic patterns and resource allocation effectively across Albania. This study identifies the advantages of Albania comparing to other neighboring countries and of Tirana as favorable locations for this economic activity. Furthermore, it assesses the impact of this growth on employment levels, particularly among youth and women, while highlighting improvements in communication skills of the employees.*

Keywords: *Call Center, GIS, spatial patterns, youth employment*

I. INTRODUCTION

Tirana is the capital city of Albania and the place where the first Call Center was opened in 2005. Even after 20 years, it continues to have the higher number of Call Centers companies and employees. In these last decades, Tirana has emerged as a dynamic hub for business process outsourcing (BPO) and call center operations, especially for the Italian speaking ones, but as well for the English, German and French. This growth is driven by various factors such as: abundant human resources; higher percentage of population with foreign language proficiency; competitive labor cost; decreasing costs of electronic equipment etc. Albania as well, if compared with other neighbor countries, especially, North Macedonia, Kosovo, Serbia and Montenegro has some other locational advantages such as: cultural affinity with Italy; higher percentage of people who speak Italian; favorable climate conditions; geographical proximity to Italy etc.

Call centers are specialized service units that manage vast volumes of telephone communication to support customer service operations and enable data-driven decision-making processes [1], [2]. Their role in enhancing customer interactions and streamlining operational processes is well documented in international research. In Tirana, these centers benefit from the global shift towards digitalization. Beyond their operational role, the spatial patterns of call center distributions in Tirana offer critical insights into urban economic development. Geographic Information System (GIS) provides innovative tools to analyze the relationship between spatial clustering and industry performance, as well other facilities and locational advantages. This spatial perspective of this research is particularly valuable for call centers businesses, but also for urban planners and policy makers as they seek to integrate emerging technologies within the existing urban landscape to have higher incomes.

In this paper there is used a comprehensive GIS-based analytical framework to explore the spatial dynamics associated with the call center industry in Tirana. By integrating insights from digital communication research with quantitative spatial analysis, the paper aims to reveal how geographic patterns influence both operational efficiency and expansion strategies in Tirana. Ultimately, the

findings are expected to inform policy decisions and practical strategies for technological innovation and economic growth within the city.

II. LITERATURE REVIEW

Call center services have experienced substantial growth in the past few decades, by enhancing the variety of services offered and becoming essential in the organization of communication and outreach, becoming more global. In the recent decades the Call Centers worldwide have undergone significant transformations, led mainly by the rapid development of technology and working forces dynamics. These changes have been reflected also in their geographical distribution in the world and are being open in many countries which were out of reach, such as Albania and other communist countries.

Globalization is emphasized by many scholars, as the primary drivers of change in the Call Center's industry not only in the geographical distribution, but especially in the new technologies applied and the working place [3]. The international perspective of Call Centers is further analyzed by Jobs, who provide a balanced assessment of the social and economic impacts within local context (Ireland), while situating them in the global trend as well [4].

This is possible due to the technological innovations, especially the transition from traditional PSTN systems to the next-generation network (NGN), which is well documented by Deng and Deng, who describe the implementation of soft-switch technology to enable distributed call center designs that reduce operating costs while increasing flexibility [5]. This was widely used during and after the Pandemic Covid-19 also, when the number of employees working from home is higher and is beneficial both for the employers and employees.

The impact of technology's innovation was earlier discussed by other authors, who have explored the impact of the application of open-source platforms such as Open VPN etc. to the facilitation of Call Centers distribution by illustrating how enterprises leverage these innovations to maintain high service levels [6]. Meanwhile, Mohammed and Pang, in 2011, contributed to this line of research by focusing on personalized call traffic prediction and efficient call distribution, which are critical in maintaining system performance as call centers become more decentralized. The literature also highlights the evolution toward cloud-based operations. Miller offers a comprehensive account of how cloud computing is being utilized in call center environments, enabling scalable, distributed infrastructures that support both remote work and rapid service adaptation [7]. This technological shift not only facilitates distributed call center models but also harmonizes with evolving knowledge management approaches as described by Richards [8], wherein the dynamics of acquiring, sharing, and utilizing knowledge are reconfigured to meet the demands of a digital and decentralized service environment.

An important aspect of the Call Centers that has attracted researchers' attention is the evolution of their workplace dynamics, related to the changes on the job structures and labor relations that reflect broader economic and sociological trends [9] and to the shifts in job security and career trajectories, emphasizing that initial disruptions in job structures are often followed by re-establishment of structured career paths that accommodate both flexibility and security [10].

In the last years, researchers are focusing in another aspect of Call Centers operation, such as the integration of emotional data in call processing [10], who demonstrate that who demonstrate that emotion distribution can significantly influence the efficiency of call redirection and contribute to time savings in emergency contexts.

The literature on call centers in Albania remains limited, with studies mostly focused on the relevant insights within broader themes such as digital transformation, crisis communication, and public service delivery. Direct academic focus on call center operations is scarce, in contrast to the extensive international literature examining recruitment, technology integration, and workforce challenges [3], [8].

A major area of inquiry within the Albanian context relates to public emergency systems. The research

of Brataj and Dogjani [11] provide a detailed examination of Albania's emergency medical services, highlighting the integral role of call centers in facilitating timely response and coordination. Their findings emphasize the operational and logistical challenges faced in managing call flows within decentralized healthcare structures.

Complementing this operational perspective, network-based analyses have been applied to the Albanian telecommunications sector. Gjermëni [12] examine landline call data from a southern operator, using statistical techniques to explore network connectivity and call distribution patterns. Other researchers [13] investigate mobile banking applications, identifying infrastructure and user-experience challenges relevant to digital service delivery. While not focused on call centers, their discussion on reliability and scalability is transferable to this domain. Similarly, Mustafa and others [14] examine digital crisis communication during the COVID-19 pandemic, offering relevant frameworks for rapid-response information systems like call centers.

While dedicated Albanian studies on call centers are sparse, existing literature from public health, telecommunications, and digital communication provides a valuable foundation. There remains a significant gap in focused research on commercial call centers, particularly in areas like customer service, employee experience, and outsourcing strategies.

III. METHODOLOGY AND METHODS

This research adopts a spatial analytical framework using Geographic Information Systems (GIS) to investigate the locational behavior and spatial patterns of the call centers in Tirana, Albania. By leveraging spatial data on urban infrastructure, public services, and transportation, the study aims to identify patterns and correlations that influence where call centers tend to locate within the city.

The central hypothesis is that call centers in Tirana exhibit spatial preferences based on accessibility to key urban amenities and infrastructures, such as proximity to bus stations, state institutions, Universities, students' dormitories and healthcare facilities. Furthermore, the study explores the role of centrality—especially the influence of the city center—as a spatial attractor.

The methodology of the study is structured into four main phases: data acquisition and preparation, spatial data processing, analytical mapping and visualization, and interpretation of spatial results. For each of the phases there were used different methods and tools in ArcGIS and other online sources.

A. Data Acquisition and Preparation:

In order to prepare the data for the further analysis a variety of spatial datasets were compiled from both primary and secondary sources such as:

- ***Call Center Locations:*** The point layer representing call centers was created by geocoding verified addresses of call centers operating in Tirana. These were collected from business directories, field verification, and online sources. Each point includes attribute data such as company name and business type.
- ***Bus Stations:*** This dataset was extracted using Overpass Turbo from OpenStreetMap (OSM). Only officially mapped urban bus stops within the administrative boundary of Tirana were included. The data was exported in. geojson and converted into .shp (shape file) format in ArcGIS Pro.
- ***Public Institutions:*** This includes locations of ministries, municipal offices, universities, and other administrative buildings. The data was compiled from the official websites of government institutions, geocoded and spatially verified.
- ***Healthcare Facilities and Higher Education locations:*** Includes hospitals, public clinics, and private health centers, Faculties. This layers were sourced from OSM and cross-referenced with the Albanian Ministry of Health and Ministry of Education.
- ***City Center:*** The city center was defined spatially using Skanderbeg Square as a reference point and was digitized as a point feature.

- ***Municipal Boundary and Roads:*** The boundary shape file for Tirana Municipality was obtained from the Geoportal of Albania or GADM, and serves as the spatial frame for the study area. Further the roads where clip to the Tirana Municipality mask.

All spatial data were projected to the WGS 1984 UTM Zone 34N coordinate system for consistency and spatial accuracy.

B. **Second phase of Data Processing and Integration:**
After acquisition, all layers were cleaned, re projected, and standardized in terms of geometry and attribute fields. Additional fields such as coordinates (longitude and latitude) were added to the call center layer using the "Add Geometry Attributes" tool in ArcGIS pro. To ensure spatial validity, topological checks were performed on all layers. Non-urban or redundant features were removed, and point layers were clipped to the Tirana boundary.

C. **Third phase of Spatial Analysis Techniques**
Proximity Analysis. Distances from each call center to the nearest bus station, public institution, and healthcare facility were calculated using the Near tools. This allowed for quantification of accessibility and helped identify whether call centers tend to cluster around certain services. b. Kernel Density Estimation (KDE)

A heat map of call center locations was produced using KDE to visualize spatial concentration. This helped reveal urban hotspots and detect whether call centers are distributed randomly, evenly, or clustered in specific neighborhoods.

D. **Third phase of Spatial Analysis Techniques**
Map design and visualization. All analytical outputs were visualized in thematic and analytical maps using consistent symbology and color schemes. The spatial results are interpreted focusing on accessibility, agglomeration, and centrality. The findings are then compared to known characteristics of the BPO industry in Albania, such as labor supply, cost structure, and proximity to transportation.

The study included also surveys with employees and interviews with employers of Call Centers. The survey was distributed online to the people working in these centers. The survey had the aim to prove that the Call center industry has majority of young females employed, but it is not seen as a permanent job. Especially, through the questionnaire it was aimed to prove that the main language preferred used to be Italian, but lately other languages such as: English, German, French etc. are being used in the Call Centers. The results of the survey were used also for the results and discussion part on the advantages that Tirana has compared to other cities about young population with one or more language proficiency, accessibility etc.

IV. RESULTS AND DISCUSSIONS

The spatial distribution of call centers in Tirana reveals important insights into the factors influencing their location choices. Through a geospatial analysis of proximity to bus stations, higher education institutions, and public institutions, it becomes evident that call centers are strategically located to optimize access to infrastructure, workforce, and urban services. The analysis supports the application of urban economic theories, such as agglomeration economies and central place theory, which posit that service industries tend to cluster around areas that maximize accessibility and minimize operational costs [15], [16].

A. Call Centers and Proximity to Bus Stations

The first map illustrates the spatial relationship between call centers and bus stations. A substantial concentration of call centers is observed within short walking distances of transportation hubs (Fig. 1). Specifically, most call centers are located within 134 meters of a bus station. This proximity is critical in a city like Tirana, where a significant proportion of the working population, including students and young professionals, rely on public transportation.

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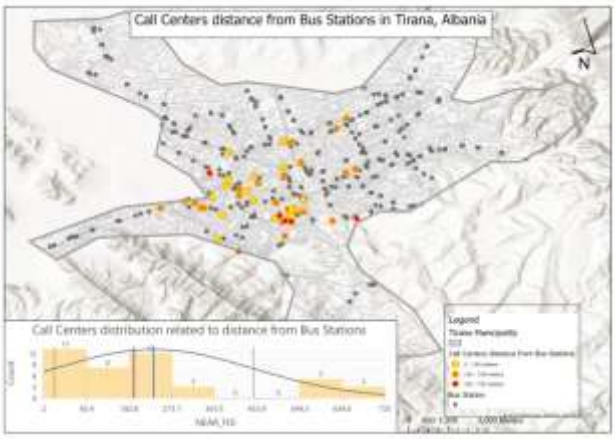

Fig.1. *Call Centers Distance from Bus Stations in Tirana, Albania*

The histogram further supports this finding, with the highest frequency of call centers located within the first two distance categories (2–134 m and 135–318 m). These findings suggest that transport accessibility plays a crucial role in shaping business location decisions for call centers. From a workforce perspective, easy access to transportation minimizes commuting time and increases job attractiveness, particularly for part-time or entry-level workers, which are in majority in the call centers [17].

This aligns with the broader literature on service-based economies, where firms prioritize locations that provide efficient access to labor and reduce turnover [18]. Furthermore, areas with high transportation connectivity tend to be more commercially attractive due to increased foot traffic, visibility, and logistical convenience.

B. Call Centers and Proximity to Public Institutions

The other map is to explore the relationship between call centers and public institution, where it is seen a clear pattern, with most call centers located within 200 meters of a public institution (fig.2).

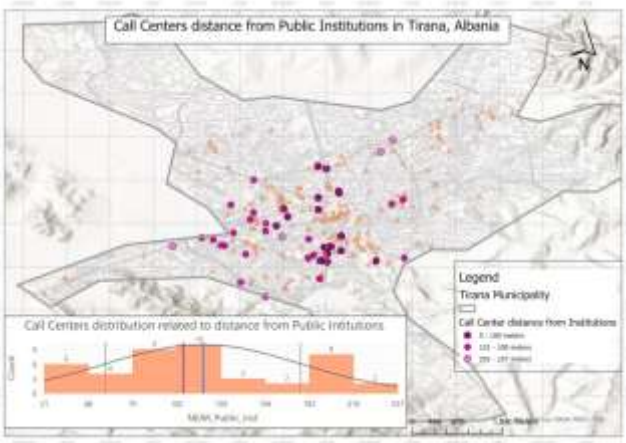

Fig.2. Call Centers distance from Public Institutions

This can be partially explained by the centralization of public services in Tirana's urban core, but it may also indicate a preference for visibility, legitimacy, and ease of regulatory compliance. From the information that we get from the histogram it quite evident this correlation and it confirms this trend. The highest number of call centers is found within the 5–100 m and 101–200 m distance brackets, even more close to the bus stations examined earlier. The proximity to public institutions can be seen as advantageous from the Call Centers' owners because it may also facilitate administrative procedures, including licensing, inspections, and tax filings—processes that are more efficiently managed when institutions are nearby. Moreover, being located near government offices and other official bodies may

enhance a call center's image of credibility and professionalism. In many cities, businesses located near institutional centers benefit from better infrastructure, safety, and higher business confidence among clients and partners [19].

C. Call Centers in Relation to Higher Education Institutions

The third map is a heat map to display the density of call centers relative to faculties and higher education institutions. From these analysis, a notable clustering of call centers is seen around university areas in the southern part of Tirana, where both call center and faculty densities are highest. This spatial correlation reinforces the idea that call centers strategically position themselves near sources of affordable and skilled labor.

Higher education institutions in Tirana, such as the University of Tirana, especially the Faculty of Foreign Languages, provide a consistent number of young, educated, and often multilingual individuals, particularly fluent in Italian and English. These language skills are essential for call centers serving international clients, especially in outsourcing and BPO (Business Process Outsourcing) sectors.

The location strategy is consistent with studies that highlight the tendency of knowledge-based or labor-intensive service industries to co-locate near academic institutions to leverage both talent and innovation [20], [21]. The proximity also facilitates flexible work arrangements for students, many of whom seek part-time employment while studying. This further underlines the socio-economic role of call centers in providing accessible employment opportunities for youth (fig.3).

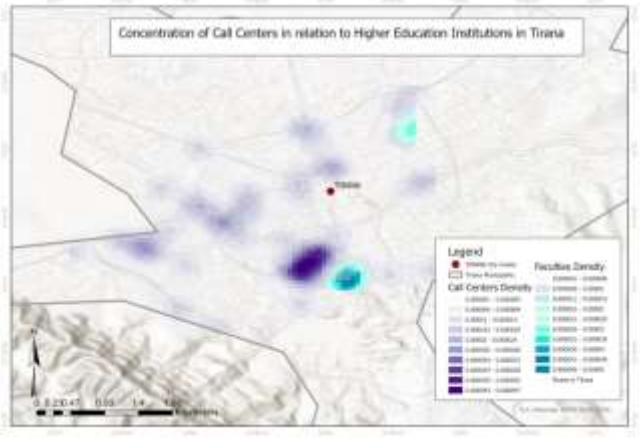

Fig.3. Concentration of Call Centers in Relation to Higher Education Institutions in Tirana

D. Spatial patterns of Call Centers in Tirana

The findings across all three spatial analyses confirm a strategic urban clustering behavior of call centers in Tirana. These businesses gravitate toward well-connected urban nodes, offering access to infrastructure (bus stations), talent (universities), and services (public institutions). This reflects the broader economic logic that drives service industries to maximize economies of scale and labor accessibility through spatial proximity.

The observed spatial concentration also reveals the emergence of informal business districts or service corridors in the city. While such patterns may stimulate urban vibrancy and economic growth, they also present challenges related to traffic congestion, real estate competition, and pressure on public infrastructure in concentrated zones. Urban planning strategies must therefore integrate service-sector growth models to ensure sustainable city development.

Additionally, Tirana's case mirrors trends in other developing cities, where call centers often emerge in central or semi-central zones with a high density of younger, educated populations, supported by relatively low living and operating costs compared to Western Europe [22]. These dynamics suggest Tirana's increasing role as a regional hub for outsourced services in Southeast Europe.

V. CONCLUSIONS

This study has demonstrated that the spatial distribution of call centers in Tirana is not random but rather shaped by a combination of infrastructural, educational, and institutional factors. The analysis highlights a clear spatial clustering of call centers around bus stations, higher education institutions, and public administrative centers. These urban nodes provide essential advantages such as access to a young, educated, and multilingual labor force, affordable transportation for employees, and proximity to regulatory institutions.

The findings affirm key principles from agglomeration theory and urban economics, suggesting that businesses in the service sector, especially those reliant on labor and communication infrastructure, seek to optimize their locational efficiency. Tirana's urban environment, marked by its affordable commercial spaces, declining technology costs, and cultural alignment with Western Europe, particularly Italy, offers an enabling environment for call center proliferation.

Importantly, the presence of a flexible, student-based workforce and widespread Italian language proficiency has positioned Tirana and Albania as a competitive outsourcing destination. However, the spatial clustering of call centers may also result in localized pressures on urban infrastructure, and policy interventions may be necessary to address sustainability and potential saturation.

From a broader perspective, the development of call centers has brought significant socioeconomic benefits, including youth employment, skill development, and upward mobility in Tirana and other smaller cities of Albania. As the sector matures, future studies should explore how evolving digital infrastructure, remote work trends, and diversification away from the Italian market may impact the spatial dynamics and long-term sustainability of this industry in Albania.

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