



# Implementation of Geolocation Technology for Modeling the Distribution of Micro, Small, and Medium Enterprise (MSME) Business Potential Using a GeoJSON-based Spatial Format

Angga Setiyadi\*, Eko Budi Setiawan, Chrismikha Hardyanto, Eddy Soeryanto Soegoto

Universitas Komputer Indonesia, Bandung, Indonesia

\*Correspondence: E-mail: [angga.setiyadi@email.unikom.ac.id](mailto:angga.setiyadi@email.unikom.ac.id)

## ABSTRACT

This study implements geolocation technology with a JSON-based spatial format to model the distribution of Micro, Small, and Medium Enterprises (MSMEs) business potential in West Java, Indonesia. Tabular records from spreadsheets were transformed into that spatial format, integrated into a browser-based map, and their spatial accuracy was tested by comparing point visualizations between the web map and a desktop environment. The system consistently displayed business locations and attributes and offered an accessible, lightweight interface that requires no additional software. The approach was chosen because it natively combines geometry and properties, enables direct loading in browsers, and supports responsive interaction, which reduces friction for stakeholders who need spatial insight but lack GIS expertise. The workflow emphasized clear data preparation, manual geocoding, and verification against desktop outputs. Impact: The application supports spatially informed planning and decision making and provides a foundation for future capabilities such as automated geocoding, search, regional categorization, heatmaps, and interactive dashboards.

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## 1. INTRODUCTION

The evolution of information and communication technology has acted as a catalyst for the increasing application of spatial data across a wide range of domains, from strategic planning to business potential modeling. Geolocation technology has developed into an essential part of the digital ecosystem, with broad applications in industries such as tourism, logistics, and spatial data management within geographic information systems (GIS). Internet-based geolocation has notably advanced alongside improvements in both software and hardware, which now enable the capture and processing of location data in near real time. Among the available methods, Assisted GPS is one of the most widely implemented approaches. It combines traditional GPS signals with communication networks, resulting in faster and more accurate positioning [1-2]. The integration of geolocation into intelligent systems is also expanding. For instance, it has been used in route recommendation models that incorporate both weather forecasts and geospatial data, showing how spatial information can enhance everyday digital services [3]. In a relevant case, Setiyadi and Setiawan highlighted the use of GeoJSON for efficient rendering of interactive spatial data, particularly in mapping micro and small business entities in West Java. Their findings showed that GeoJSON improves map loading speed and interactivity, making it a highly suitable format for dynamic spatial visualization at the regional level.

Despite its widespread adoption across various sectors, the application of geolocation technology for modeling local business potential continues to face significant challenges. A central issue is the lack of structured spatial data formats that can be readily integrated into interactive mapping platforms, especially in contexts involving micro, small, and medium enterprises (MSMEs). Much of the existing business location data remains in tabular formats, such as Excel files, which do not include spatial attributes like latitude and longitude. While GeoJSON provides advantages in terms of interoperability and ease of integration with libraries like Leaflet, its use remains relatively uncommon in practice. In addition, spatial representations often neglect polygon-based modeling of administrative boundaries or market zones, while using point coordinates for business locations without sufficient contextualization. As a result, spatial visualizations tend to lack depth and meaningful interpretation. Earlier research on Location-Based Services (LBS) has focused more on consumer-facing applications or navigation rather than strategic visualization for economic planning. A more practical and systematic approach to incorporating spatial data into digital platforms is needed to make business opportunity mapping more relevant and informative.

In many cases, users resort to GIS tools when attempting to convert Excel data into GeoJSON. These tools are widely used due to their ability to simplify the process of loading and exporting spatial data into formats like JSON [4]. However, setting up and operating such tools is not always straightforward. They often require a degree of technical skill that many non-expert users do not possess, which can be discouraging and limit the adoption of spatial solutions. Furthermore, the lack of publicly available spatial datasets (especially those outlining administrative boundaries) reduces the contextual quality of resulting visualizations. The unfamiliarity with GeoJSON as a format, coupled with non-intuitive interfaces in many mapping tools, adds another layer of difficulty in interpreting spatial data. Lewis and colleagues noted that combining web-based GIS systems with shapefiles and simulation tools can enhance the practical and interactive exploration of spatial datasets [5]. Research by Setiyadi has further shown that the implementation of geolocation-based applications allows business actors to reach customers more efficiently by making their locations directly visible within user interfaces [6]. The combination of Leaflet and GeoJSON has proven effective for

delivering lightweight, informative, and accessible interactive maps that do not require high-end hardware or complex installations [7-8].

This study seeks to address those challenges by developing a Web-GIS solution that is lightweight and user-friendly. To overcome the limitations discussed above, a web application was designed with interactive mapping functionality that visualizes the spatial distribution of business potential using the GeoJSON format. While the application does not perform automated data conversion, it offers a visualization environment that avoids the need for additional software installation. Instead, it depends on spatial data prepared externally through conventional GIS tools. The intended contribution of this system is to serve as a practical tool (particularly for MSME stakeholders, local government, and development planners) to support spatially informed decision-making, data-driven planning, and strategic mapping efforts in an efficient and structured manner.

## **2. LITERATURE REVIEW**

### **2.1. Business Owners**

Business owners are individuals or entities (formally registered or not) who engage in planned and continuous economic activities to produce goods or services for profit. In the Indonesian legal context, this term includes not only entrepreneurs who initiate new ventures but also traders, cooperatives, companies, and other actors involved in the broader economy. These business owners play a crucial role in the economic ecosystem by acting as producers, distributors, and service providers that respond to market demands.

They are key contributors to shaping market structures and ensuring fair and healthy competition. While some business owners arise from entrepreneurial initiatives, not all align with the archetype of disruptive or innovative entrepreneurs. Many manage conventional businesses, yet their role remains significant in generating employment and supporting the stability of the local economy. The MSME sector in Indonesia serves as the backbone of the people's economy, largely due to its adaptability and ability to absorb a considerable workforce [9]. With the right empowerment and innovation, this sector can increase business owners' income and elevate the living standards of surrounding communities. Hence, business owners should be viewed as fundamental agents in driving economic development, maintaining the flow of local goods and services, and strengthening economic resilience at the grassroots level.

### **2.2. Geolocation**

Geolocation refers to the process of identifying and determining the precise physical location of a computing or networked device. This technology underpins numerous location-based applications, including platforms like Foursquare. Geolocation data may be derived from multiple sources (GPS satellites, Wi-Fi networks, cellular towers, or IP addresses), each offering varying levels of accuracy and coverage.

Such data are used across diverse contexts: navigation, asset tracking, targeted marketing, and spatial data collection to support regional analyses. Schiller and Voisard emphasize that geolocation forms the architectural backbone of Location-Based Services (LBS), enabling digital services to tailor content and functionalities based on user location. Core functions of geolocation include positioning, tracking, geofencing, geocoding (converting addresses into coordinates), and real-time, context-aware services. Its applications have extended into daily life, including vehicle navigation, business mapping, logistics, and emergency response. Recent advances in tracking technologies, powered by intelligent algorithms and sensor integration, have enhanced geolocation systems' ability to predict movement patterns more

accurately. As such, geolocation has evolved beyond simple positioning to become a foundational element of adaptive and personalized digital platforms.

### **2.3. GPS**

The Global Positioning System (GPS) is a satellite-based navigation system that delivers precise three-dimensional positioning (latitude, longitude, altitude) along with accurate time synchronization on a global scale. GPS relies on a constellation of at least 24 satellites transmitting signals to Earth. A GPS receiver calculates its position by measuring the time delay of signals from multiple satellites and applying trilateration algorithms.

Equipped with GPS sensors, devices such as smartphones, vehicles, and navigation systems can determine their position in real time. Without this sensor component, GPS functionalities cannot operate. GPS serves multiple roles, including location tracking, real-time navigation, geographic mapping, and synchronization of time-sensitive systems. It has become the core enabler of modern LBS infrastructure. In the context of public transportation, for example, the use of GPS for real-time fleet tracking has been linked to improved service reliability and user satisfaction. A study on Bangkok's transit system found that regular use of GPS significantly enhanced operational efficiency [10]. Beyond transportation, GPS also supports mobile vendor tracking, disaster response logistics, and supply chain monitoring demonstrating its growing impact across various sectors as a productivity-enhancing tool.

### **2.4. Latitude and Longitude**

Latitude and longitude constitute the essential reference coordinates in the geographic coordinate system used to identify specific locations on Earth. Latitude represents the distance north or south from the equator, ranging from 0° to 90°, while longitude measures the distance east or west from the prime meridian, up to 180°. Together, these coordinates form the foundation for both digital and analog spatial representation.

Coordinates are typically expressed in two formats: decimal degrees (e.g., -6.2088, 106.8456) and degrees-minutes-seconds (e.g., 6°12'32"S, 106°49'22"E). While these may appear as stylistic alternatives, they reflect the underlying structure of geospatial data. Latitude and longitude provide a consistent, universally recognized framework essential for mapping and location-based analysis. Their applications span numerous domains, including disaster response mapping, vehicle tracking, and geotagging points of interest. As such, these coordinates function as the backbone of spatial referencing and are central to the accuracy and reliability of any geospatial system.

### **2.5. GeoJSON**

GeoJSON is a format derived from JSON, adapted specifically for encoding geographic data structures. It supports seven types of geometry, including Point, LineString, and Polygon. Because GeoJSON is text-based and readable with standard text editors, it is widely adopted in GIS software and spatial databases. Its simplicity and compatibility make it a preferred format for spatial data exchange and visualization. Furthermore, it aligns with standards such as JSON-LD and can be validated using JSON Schema.

GeoJSON structures consist of three main object types: Geometry (defining shapes and coordinates), Feature (combining geometry with attributes), and FeatureCollection (grouping multiple features). All coordinates are expressed in WGS 84 using decimal degrees. For instance, a shop location may be defined as a Point with coordinates [107.6186, -6.9039], and enriched with properties such as shop name and product type. A common workflow involves converting tabular data (e.g., Excel or CSV files) into GeoJSON using GIS tools like

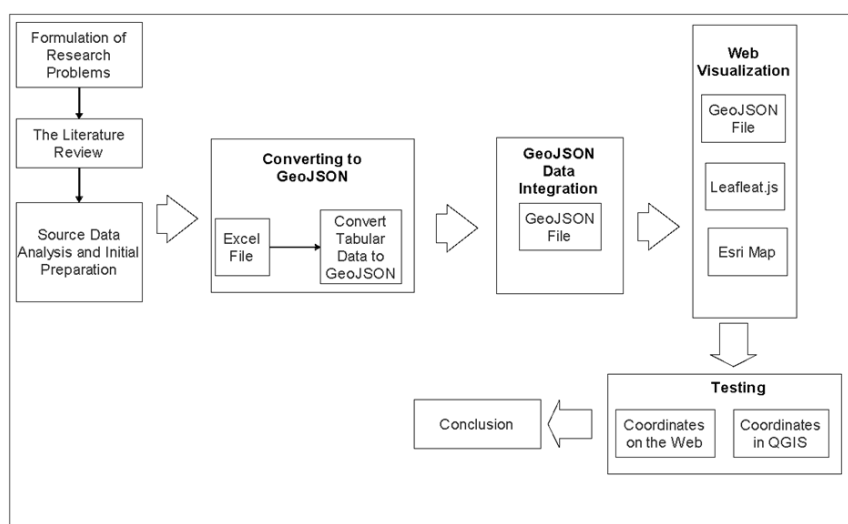
QGIS. Once the file includes both geometry and attributes, it can be directly imported into web mapping platforms.

GeoJSON enables interactive spatial visualizations, allowing users to click on map points, explore details, and conduct basic spatial analyses. Its ability to encapsulate both spatial and attribute data in a lightweight format has led to its widespread use in modern mapping applications. With its ease of use, storage efficiency, and strong browser compatibility, GeoJSON is ideal for visualizing business potential distribution, supporting regional planning, and enabling responsive real-time spatial analysis.

### 3. METHOD

This study employed a quantitative descriptive analysis approach to present clear, data-driven insights into the implementation of geolocation technology for business potential modeling [11]. The methodology was designed to transform tabular business data into spatial information using the GeoJSON format, integrate it into a web-based mapping platform, and evaluate the spatial accuracy of the visualized data.

**Figure 1** illustrates the framework used in modeling the spatial distribution of business potential based on geolocation and GeoJSON technology.



**Figure 1.** Methodology for Implementing Geolocation Technology in Modeling Business Potential Distribution Using GeoJSON.

The workflow began with identifying the research problem: the challenge of visualizing business location data that exists solely in tabular (non-spatial) formats. Addressing this limitation required a step-by-step procedure to convert and visualize spatial data meaningfully. A literature review was conducted to understand the theoretical foundation and technical aspects of key components such as GeoJSON, Leaflet.js, and Esri-based map visualization platforms. This ensured that the selected tools and methods were grounded in both scientific relevance and technical applicability.

The next stage was source data analysis and preparation. Business data in Excel format (including seller names, product types, and addresses) was reviewed manually for consistency and completeness. Spatial attributes such as latitude and longitude were then added manually to enable geolocation. After this enrichment, the data were converted into the GeoJSON format using GIS tools capable of reading and transforming coordinate points into structured spatial features. This format was chosen because it is lightweight, easily parsed by mapping libraries, and integrates seamlessly into web interfaces.

The GeoJSON file produced was uploaded into Leaflet.js for visualization, while Esri's platform served as a benchmark for comparative testing. The converted spatial data were rendered into interactive maps, enabling real-time display of MSME locations. Accuracy testing was conducted by comparing the web-based outputs with spatial points in QGIS, a desktop GIS application known for precision. This comparison ensured that the coordinate conversion and integration process retained positional fidelity.

All stages combined to create a replicable system that effectively converts and presents MSME data through intuitive and accurate web-based spatial mapping, enabling improved access, analysis, and planning.

## 4. RESULTS AND DISCUSSION

### 4.1 Source Data Analysis and Initial Preparation

Source Data Analysis was conducted to understand the structure, character, and appropriateness of the data used in the spatial modeling process for business potential distribution (**Figure 2**). Data analysis for new entrepreneurs provides a platform for researchers to determine the needed system development characteristics [12]. Srinivasan stated that the success of development analysis greatly depends on the availability of a well-designed database, encompassing spatial, economic, and socio-economic attributes, and supporting interoperability among variables and methodologies [13]. The initial data for this research were obtained in tabular format (Excel), containing location information and business attributes such as name, type of business, and geographic coordinates. This stage is crucial to ensure that the data to be converted into GeoJSON format has sufficient quality and consistency, and is suitable for integration into a web-based interactive mapping system. The source data analysis obtained in tabular format (Excel) consists of product name, seller name, type of sales, and business address. The following figure presents the source data analysis.

Based on **Figure 2**, the data was obtained in tabular format, containing information such as product name, seller name, type of sales, home address, and village name. However, this data does not yet contain explicit spatial attributes, such as geographic coordinates (latitude and longitude). All geolocation approaches (whether based on light intensity, satellite imagery, or IP address databases), fundamentally require or produce geographic coordinates, namely latitude and longitude, as a basic form of spatial representation to determine the position of objects on the Earth's surface [14-16]. The data obtained from the source data analysis cannot yet be visualized within an interactive mapping platform. Therefore, a validation process is conducted to ensure consistency in the address formatting and completeness of data entries to support the subsequent spatialization process. The result of the spatialization process, through the addition of latitude and longitude coordinates based on the business location (see **Figure 3**).

A	B	C	D	E
nama_produk	nama	nama_jenis_penjualan	alamat_rumah	nama_desa
Cilok Mas Eko	Eko Penjual	Cilok Pedas	Jl. Sekeloa 128 Bandung	Lebak Gede
Cilok Mas Eko	Eko Penjual	Cilok Pedas	Jl. Sekeloa 128 Bandung	Lebak Gede
Baso	Baso 2	Baso	Dago	Lebak Gede
Baso	Baso 2	Baso	Dago	Lebak Gede
Baso	Baso 2	Baso	Dago	Cipadung
Baso	Baso 2	Baso	Dago	Cipadung
Baso	Angga Setiyadi	Baso Iga	Jl. Dipati Ukur No 8	Lebak Gede
Baso	Angga Setiyadi	Baso Daging	Jl. Dipati Ukur No 8	Lebak Gede
Baso	Penjual Kelling	Baso Saja	Jalan Xyz	Lebak Gede
Ice coffee	Fajar Laksana	Ice coffee latte	Jl.Bojong Raya No. 14	Lebak Gede
Ice coffee	Fajar Laksana	Americano	Jl.Bojong Raya No. 14	Lebak Gede
Batagor Kuah SD	Amal	Batagor	Jl. Sekeloa Utara No.30, Sekeloa, Ke	Sekeloa
Batagor Kuah SD	Amal	Batagor	Jl. Sekeloa Utara No.30, Sekeloa, Ke	Dago
Batagor Kuah SD	Amal	Batagor Kering	Jl. Sekeloa Utara No.30, Sekeloa, Ke	Dago
Batagor Kuah SD	Amal	Batagor Kuah	Jl. Sekeloa Utara No.30, Sekeloa, Ke	Dago
Batagor Kuah SD	Amal	Batagor	Jl. Sekeloa Utara No.30, Sekeloa, Ke	Dago
Nasi	Fathoni	Nasi Goreng	Sekeloa	Kebon Pisang
Mie Ayam Bakso	Arno	Mie Ayam Bakso	Sadang serang	Mekarsari
Mie Ayam Bakso	Arno	Mie Ayam Bakso	Sadang serang	Mekarsari
POTATOS TIWSTY	Zaed Ismail	Potatos tiwsty	Kp.leles RT 04 RW 12 ,desa.mekars	Manggahang
BATAGOR	Devis sanjaya	Batagor	Tubeagus Ismail/dago	Lebak Gede
Gorengan	Ida Farida	Gorengan	Jl.Palintang no 22. Ranca	Pasirwangi

**Figure 2.** Source Data Analysis.

A	B	C	D	E	F	G
nama_produk	nama	nama_jenis_penjualan	alamat_rumah	nama_desa	latitude	longitude
Clor	Yayang toto rosa	Clor	Jln.holis cibuntu selatan	Margahayu Utara	-6.9494278	107.5793537
Clor	Yayang toto rosa	Bilor	Jln.holis cibuntu selatan	Margahayu Utara	-6.949415	107.579402
Cuarli Kang Adong	Adong	baso	Jl. Semar no 15	Kebon Pilang	-6.9174639	107.6191218
Puyunghay	hujan juhara	Puyunghay	Jl.kebonjayanti	Kebonjayanti	-6.9268002	107.6463015
Puyunghay	hujan juhara	Puyunghay	Jl.kebonjayanti	Kebonjayanti	-6.9275433	107.6463175
Baso Dua bersauda	Asep Kurniawan	Baso Lengkap	Jl. Raya Gading Tutuka, No. 66, Cingcin	Gandasari	-7.0257335	107.5522846
Baso Dua bersauda	Asep Kurniawan	Baso (isi telur)	Jl. Raya Gading Tutuka, No. 66, Cingcin	Gandasari	-7.0257335	107.5522846
Baso Dua bersauda	Asep Kurniawan	Minuman Teh panas/Dingin	Jl. Raya Gading Tutuka, No. 66, Cingcin	Gandasari	-7.0257335	107.5522846
Baso Dua bersauda	Asep Kurniawan	Baso Lengkap	Jl. Raya Gading Tutuka, No. 66, Cingcin	Gandasari	-7.0257335	107.5522846
Baso Dua bersauda	Asep Kurniawan	Baso (isi telur)	Jl. Raya Gading Tutuka, No. 66, Cingcin	Gandasari	-7.0257335	107.5522846
Baso Dua bersauda	Asep Kurniawan	Minuman Teh panas/Dingin	Jl. Raya Gading Tutuka, No. 66, Cingcin	Gandasari	-7.0257335	107.5522846
Baso	Penjual Keliling	Baso Saja	Jalan Xyz	Dago	-6.8767563	107.6097063
Baso	Penjual Keliling	Baso Yamin	Jalan Xyz	Dago	-6.8767563	107.6097063
Baso	Penjual Keliling	Baso Lengkap	Jalan Xyz	Dago	-6.8767563	107.6097063
bakso rusuk	Annisia	Es Teh Sultihan	Jl. Jatihandap	Cisaranten Kulon	-6.91044155225	107.67883143418
bakso rusuk	Annisia	Dimsum	Jl. Jatihandap	Cisaranten Kulon	-6.91044155225	107.67883143418
bakso rusuk	Annisia	Es Teh Sultihan	Jl. Jatihandap	Cisaranten Kulon	-6.91044155225	107.67883143418
bakso rusuk	Annisia	Bakso Rusuk	Jl. Jatihandap	Cisaranten Kulon	-6.91044155225	107.67883143418
bakso kelud	Yogi Resky Akhba	Masakan Ayam	Jln Cisthu Lama 2 rd.90	Dago	-6.8780032	107.6133888
bakso kelud	Yogi Resky Akhba	Masakan Ayam	Jln Cisthu Lama 2 rd.90	Dago	-6.8780032	107.6133888
bakso kelud	Yogi Resky Akhba	Masakan Ayam	Jln Cisthu Lama 2 rd.90	Dago	-6.8780032	107.6133888
Bajigur	Abdul Rasyid	Bajigur	Jl Sekeba No 17	Lebak Gede	-6.8892282	107.6177377
Bajigur	Abdul Rasyid	BandreK	Jl Sekeba No 17	Lebak Gede	-6.8892282	107.6177377

Figure 3. Source Data Analysis by Adding Coordinate Sections.

## 4.2. Convert Tabular Data to GeoJSON Using Software

After the initial analysis of the source data has been successfully carried out, which includes identifying key attributes such as product name, seller name, type of sales, address, village name, as well as location coordinates (latitude and longitude), the next step is to convert the tabular data into a spatial format based on GeoJSON. This upgrade will be utilized to enable the data to be interactive in a web-enabled mapping interface and for integration with libraries such as Leaflet, which utilizes JavaScript programming in geolocation-based computer applications. Data location visualization in web browsers and support for spatial analysis tools based on JavaScript have been observed to be efficient [17]. It is achieved through Geographic Information System (GIS) software that can take tabular data imports and convert them into GeoJSON-formatted spatial files. The use of web-based spatial visualization and geolocation requires that spatial information be converted into a state that is friendly to interaction, for instance, GeoJSON, where it can be efficiently mapped and directly analyzed within the browser. The tabular data conversion to GeoJSON in GIS applications involves four steps: importing the tabular data, converting the data into spatial points, verifying the visualization, and exporting the same as a GeoJSON layer. The result of tabular data conversion and GeoJSON testing in the GIS application is in Figure 4.

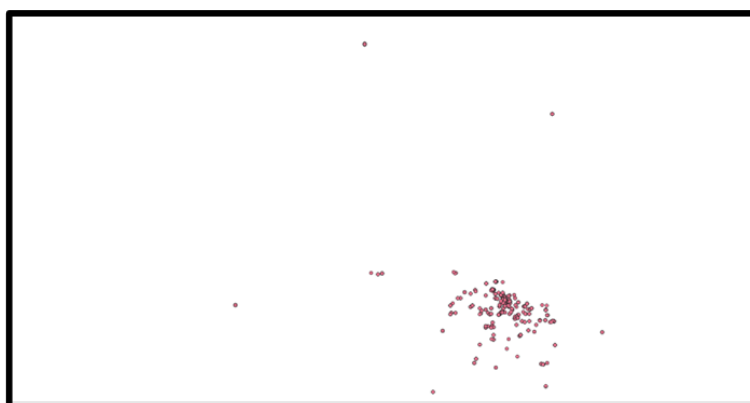
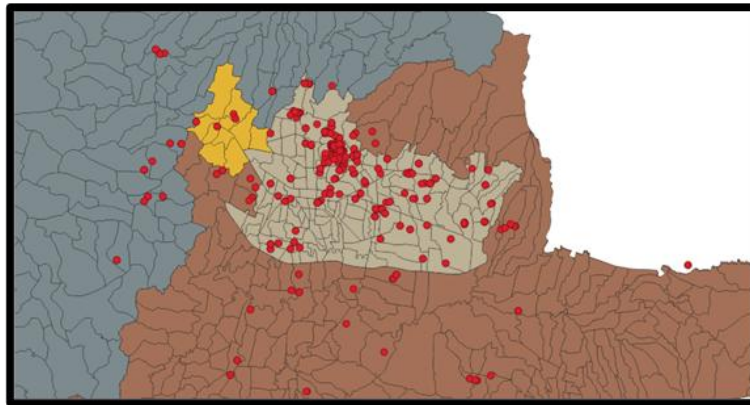


Figure 4. Distribution of Location Points from Tabular Data Conversion Results.

The first visualization is the distribution of location points that occur as a result of tabular data converted to a spatial format. In order to create more meaningful geographic information, a layer of administrative boundaries was included in the next visualization to improve the spatial context. The purpose of the integration of this administrative layer is to map the spatial relationship of the location points and administrative units, which will allow a more comprehensive analysis of the geographic distribution of the business potential in the

study area. **Figure 5** shows what the visualization looks like with the administrative boundary layer added.



**Figure 5.** Distribution of Location Points and Administrative Boundaries.

### 4.3. Integration of GeoJSON Data into Web Mapping Platforms

This step, as a follow-up process of converting tabular data into GeoJSON format, is geared towards exploiting the spatial data to build an interactive web-based mapping application (**Figure 6**). The GeoJSON file created with the help of Geographic Information System (GIS) software can be interpreted as a digital version of the spatial data that has been analyzed earlier. This is in line with the report of Rahmatulloh and Solihin, who say that a GeoJSON file is a digital representation of the spatial data. The created GeoJSON file contains both the location properties (latitude and longitude) and description (e.g., product name, type of sale, and business address). The following picture shows a part of the output screen of the GeoJSON file generated from the tabular dataset file.

```

"type": "Feature",
"properties": {
  "nama_produk": "Ice coffee",
  "nama": "Pajar Laksana",
  "nama_jenis_penjualan": "Americanos",
  "alamat_rumah": "Jl.Bojong Raya No. 14",
  "nama_desa": "Lebak Gede",
  "latitude": -6.886539360774108,
  "longitude": 107.61559414003571
},
"geometry": {
  "type": "Point",
  "coordinates": [
    107.61559414003571,
    -6.886539360774108
  ]
}
},
{
  "type": "Feature",
  "properties": {
    "nama_produk": "Batagor Kuah SD",
    "nama": "Ammai",
    "nama_jenis_penjualan": "Batagor",
    "alamat_rumah": "Jl. Sekeloa Utara No.30, Sekeloa, Kecamatan Coblong, Kota Bandung, Jawa Barat
40134",
    "nama_desa": "Sekeloa",
    "latitude": -6.8863805,
    "longitude": 107.6194882
  },
  "geometry": {
    "type": "Point",
    "coordinates": [
      107.6194882,
      -6.8863805
    ]
  }
}

```

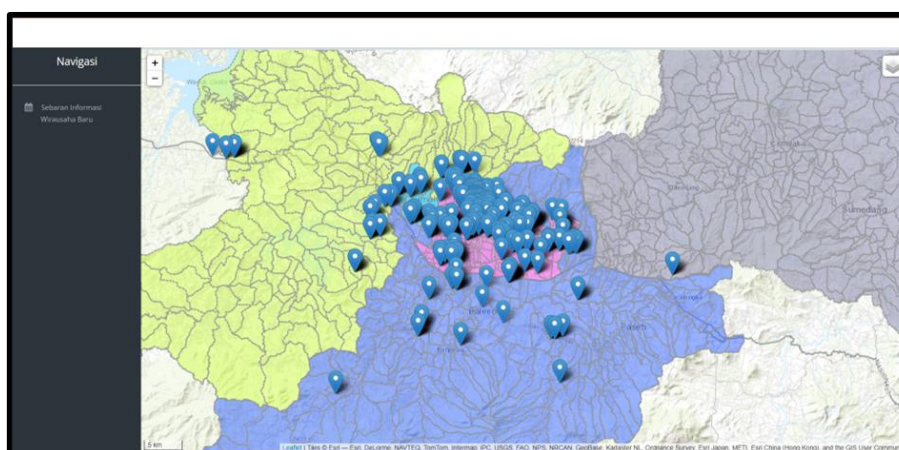
**Figure 6.** Geojson excerpt.

This GeoJSON framework gives us a representation of spatial data, as well as the descriptive qualities of the micro-scale business units. The developed GeoJSON comprises three major components, including type, properties, and geometry [18-19]. The file contains not only the location information, but also enables context-rich spatial analysis, with

properties of the name of the product, the business actor, and the address, as well as coordinate data, stored in the geometry section. It is the best GeoJSON format to be incorporated in interactive web mapping systems and desktop GIS platforms to model the spatial distribution of business potential.

#### 4.4. Results from GeoJSON Data Integration and Visualization into a Web Mapping Platform

Once the spatial data structure is successfully created using the GeoJSON format, the second phase in the process of developing an interactive web-based mapping system is to include the GeoJSON files in the mapping system. The first part of this integration is to move the ready spatial data, the administrative boundary representation files, as well as the point location files of business units, into a special directory that acts as the map layer repository. Within this implementation, there are two sorts of GeoJSON files: one that illustrates the administrative limits as a spatial reference layer, as well as another that records the location of the business units, which is expressed as latitude and longitude coordinates. The systematic positioning provides the application with the ability to load and render both layers directly, thus permitting spatial analysis within the framework of regional administration and business distribution in an integrated mode. **Figure 7** presents the output window obtained after the incorporation of GeoJSON data and its visualisation in the web mapping system.



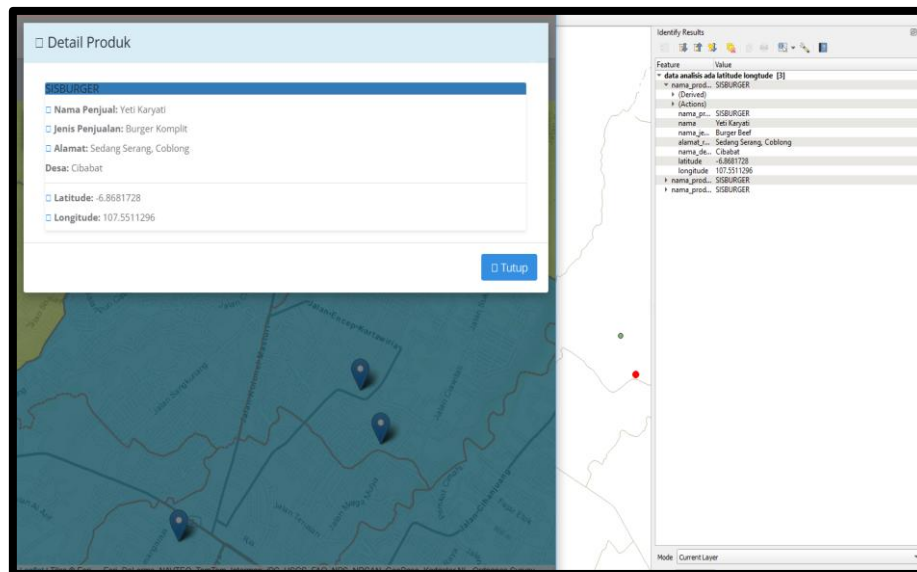
**Figure 7.** Results from GeoJSON Data Integration and Visualization into a Web Mapping Platform.

#### 4.5. Testing Location Point Consistency Across Systems

At this phase, the metric of whether the spatial data used in the web-based mapping system is consistent with the source data that is visualized using a GIS application, and in this case, QGIS. This is evaluated by comparing the visual representations and attributes of each location point (business unit) in both systems to identify that the conversion, integration, and rendering processes have been performed in a precise and consistent manner. **Figure 8** shows one of the outcomes of the testing of the consistency of the location points of the two systems.

The testing was done to ensure that the spatial data conversion between QGIS and GeoJSON files has been properly and correctly incorporated into the web-based mapping application (**Table 1**). In this test, the points of the business unit on the two systems are compared: the first is the GIS application (QGIS), which is the source of the source data, and

the second is the web-based mapping application and which is built on the data of the GeoJSON.



**Figure 8.** Testing Location Point Consistency.

**Table 1.** Test Results.

No	Product Name	QGIS Coordinate	Web Coordinate	Consistency Status
1	Mie ayam	-6.870472, 107.5254736	-6.870472, 107.5254736	Consistent
2	Donat empuk	-6.8734095, 107.5392478	-6.8734095, 107.5392478	Consistent
3	SISBURGER	-6.8681728, 107.5511296	-6.8681728, 107.5511296	Consistent

#### 4.6. Strategic Implications for MSME Potential Modeling

The application of geolocation technology to model the distribution of business potential by utilizing GeoJSON is a major advancement in serving to support spatial modeling of micro, small, and medium enterprises (MSMEs). Through the GeoJSON-based approach visualized on a web mapping platform, several strategic implications can be identified to support planning, decision-making, and development of MSMEs in a more targeted and data-based manner, including:

- (i) **Interactive and Informative Spatial Presentation.** The visualization of MSME point data within the context of administrative regions (village, sub-district, district) enables users to directly observe the geographical distribution patterns for business units. Integration with libraries such as Leaflet allows interactive data visualization, including zoom features, information popups, and layer toggling. This provides deeper spatial insights into business distribution and highlights underutilized potential areas.
- (ii) **Planning Interventions and Policies for Government Stakeholders.** The visualization of MSME point data within the context of administrative regions (village, sub-district, district) enables users to directly observe the geographical distribution patterns for business units. Integration with libraries such as Leaflet allows interactive data visualization, including zoom features, information popups, and layer toggling. This provides deeper spatial insights into business distribution and highlights underutilized potential areas.
- (iii) **Transparency and Accessibility of Data for the Public.** With a web-based system, MSME information becomes more widely accessible to the public, researchers, local investors,

and other business actors. This transparency promotes cross-sector collaboration and innovation while accelerating the mapping process of regional economic potential.

#### **4.7. Challenges and Future Development Plans**

Although the application has successfully visualized the distribution of businesses through an interactive web-based map, several technical challenges remain. One of the primary limitations is the absence of an automated geocoding process, which currently requires manual input of location coordinates. This approach is time-consuming and may lead to data inconsistencies over time. To address this issue, future development will include the integration of an automated geocoding system, enabling the application to generate geographic coordinates directly from user-entered addresses. In addition to geocoding automation, enhanced functionality such as search capabilities will also be incorporated. This feature will allow users to search for business entries by name or specific attributes. Furthermore, the system will support regional classification and filtering, enabling users to view and analyze data based on administrative boundaries or business categories. These improvements aim to enhance usability and support more comprehensive spatial analysis.

### **5. CONCLUSION**

The implementation of geolocation technology using the GeoJSON format has proven effective in modeling and visualizing the distribution of MSME business potential on a web-based platform. The conversion process from tabular data to GeoJSON produces context-rich spatial information through its properties and geometry structure, which was successfully integrated into an interactive map application using Leaflet. The testing results show that business location points and attributes can be visualized accurately and consistently with the source data, both in QGIS and on the web platform. This application supports access to spatial information without the need for additional software installation, making it practical and inclusive for a wide range of users. Future development will focus on geocoding automation, business location search, regional classification, and advanced visualizations such as heatmaps and spatial dashboards to enhance the system's functionality and strategic value.

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### **7. AUTHORS' NOTE**

The authors declare that there is no conflict of interest regarding the publication of this article. Authors confirmed that the paper was free of plagiarism.

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