International Journal of Social Science Research and Review

http://ijssrr.com
editor@ijssrr.com
Volume 9, Issue 9
September, 2026
Pages: 165-184

Analysis of Economic Activity Distribution Using an Environmental Approach in the City of Bandar Lampung

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DOI: https://doi.org/10.47814/ijssrr.v9i9.3545

Abstract

The development of economic activities in urban areas demonstrates highly rapid dynamics, particularly in developing cities such as Bandar Lampung. The growth of the trade, service, industrial, and micro, small, and medium enterprise (MSME) sectors has led to changes in land-use patterns and increased pressure on the environment. The unplanned distribution of economic activities may generate various environmental problems, such as pollution, traffic congestion, land degradation, and unequal development among regions. Therefore, a study integrating economic and environmental aspects is required to understand the distribution patterns of economic activities and their impacts on environmental conditions. An environmental approach is essential to ensure that economic activities are oriented not only toward growth but also toward sustainability. The results of this study consist of a spatial analysis using Geographic Information Systems (GIS) and an environmental approach regarding the suitability of modern market locations in relation to traditional markets in Bandar Lampung. The conclusion of the study shows that the buffer analysis with a radius of 250 meters indicates that, out of a total of 330 recorded modern markets, 292 units (88.5%) comply with the provisions stipulated in the Regional Regulation of Bandar Lampung City Number 3 of 2022. Meanwhile, 38 units (11.5%) do not comply with the regulation because they are located within a distance of less than 250 meters from traditional markets.

Keywords: *Spatial Distribution; Economic Activities; Environmental Approach.*

Introduction

The development of economic activities in urban areas nowadays shows very rapid and dynamic growth, especially in growing cities like Bandar Lampung. The increase in activities in the trade, services, industry, and micro, small, and medium enterprises (MSMEs) sectors has driven significant changes in how urban space is used (Sibiya et al., 2023;

Omowole et al., 2024). This transformation not only impacts the economy but also puts pressure on the environment, such as increased land demand, changes in land use, and potential environmental damage (Dedy et al., 2023; Wang et al., 2025).

In this context, the economic activities (especially traditional and modern markets) being referred to are their distribution, which is one of the important aspects that needs to be considered. The existence of trading facilities that develop without careful planning can lead to various problems, such as traffic congestion, environmental pollution, land quality degradation, and uneven development between regions (Permana, 2023; Unegbua et al., 2024). Therefore, a study is needed that can integrate economic and environmental aspects to understand how the distribution of these economic activities is formed and their impact on the environment (Bhattarai et al., 2020; Dedy, et al., 2021).

The environmental approach becomes very relevant in studying this phenomenon, as it allows for analysis that doesn't just focus on economic growth but also takes sustainability principles into account (Smith et al., 2022; Hariram et al., 2023; Tennakoon et al., 2024). Through this approach, it's expected to get a comprehensive spatial picture of the distribution patterns of economic activities along with their implications for the urban environment.

As one of the economic growth centers in the southern part of Sumatra Island, Bandar Lampung City plays a strategic role as a hub for the distribution of goods and services connecting Java and Sumatra. The city's rapid development is marked by growing economic activity in various sectors, which ultimately drives the formation of an uneven pattern of economic activity distribution (Li et al., 2021; Gong et al., 2025).0

Spatially, economic activities in urban areas (including markets as centers of trade activity) generally tend to cluster in locations with high accessibility, such as city centers, major transportation routes, and commercial areas (Heitz et al., 2020; Raza, et al., 2022). This is also the case in Bandar Lampung City, where market activities, both traditional and modern, are more concentrated in strategic areas. Meanwhile, the outskirts of the city are relatively lagging in economic development. This gap has the potential to create disparities in development, both economically and socially. Besides that, the proximity between traditional markets and modern markets also affects the sustainability of the local community's economic activities. Being near each other can lead to a decrease in the income of traditional market vendors, as consumers tend to choose modern markets that offer more comfort, such as cleanliness, tidiness, and completeness (Ferdian et al., 2020; Clement and Zhou, 2026). Over time, this shift in consumer preference can alter the role of traditional markets, potentially even threatening their existence, which in turn impacts the economic stability of the local community that relies on this sector.

To anticipate the unbalanced competition between traditional markets and modern markets, government intervention in the form of policies to organize economic facilities and infrastructure is necessary (Hameiri and Jones, 2024). One strategic step is to regulate the minimum distance required to establish modern markets to maintain the balance and sustainability of both market types (Allan and Nahm, 2025). In Bandar Lampung City Regional Regulation Number 3 of 2022, Article 7 paragraph (2), it is stipulated that the establishment of supermarkets must be at least 250 meters from traditional markets and is not allowed in residential areas, unless planned in a site plan as a public facility. However, field conditions show that there are still modern markets suspected of not complying with these regulations. This inconsistency has the potential to accelerate the decline of traditional markets, which have long been centers of community economic activity (Jangjarat et al., 2023; Allan and Nahm, 2025). Therefore, an analysis of the location suitability of modern markets relative to traditional markets is needed, utilizing Geographic Information System (GIS) technology to obtain a more accurate spatial overview (Ahmada and Fauzan, 2024; Tudor et al., 2025).

In Bandar Lampung City, there are approximately 39 traditional markets spread across various districts such as Tanjung Karang, Teluk Betung, Rajabasa, and others. This distribution data can serve as a basis for spatial analysis related to the suitability of modern market locations (Lu et al., 2020; Zhang et al., 2024). This information provides an overview of the geographic distribution of trading facilities, which is very important in regional planning (Bandar Lampung City Trade Office, 2025).

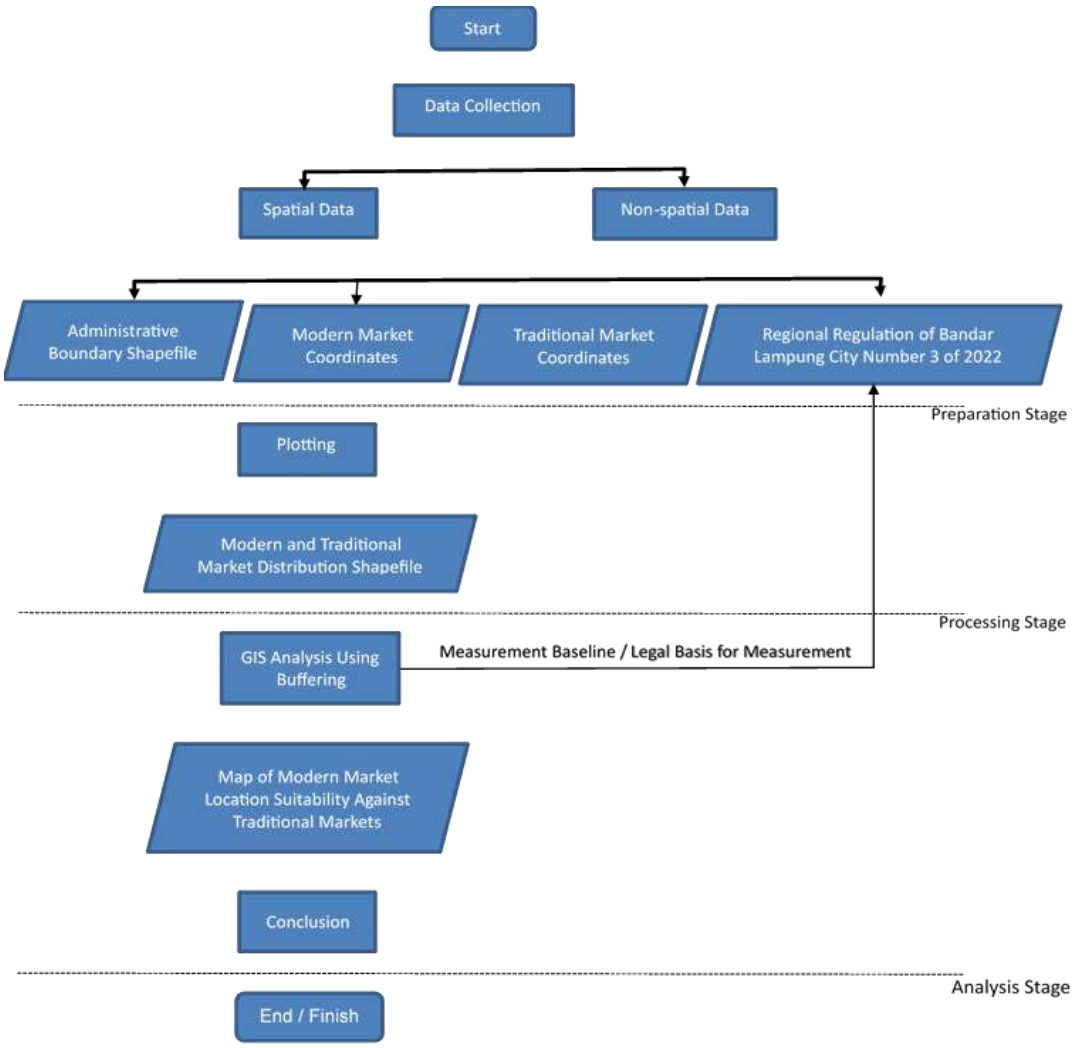
On the other hand, the high intensity of economic activities also has implications for increased environmental pressure. Trade and industrial activities contribute to increased waste, air and water pollution, and uncontrolled land use changes (Gangwar et al., 2022; Kolawole and Iyiola, 2023). These impacts can reduce environmental quality, such as decreasing green open spaces, increasing urban heat island effects, and lowering the environment's carrying capacity. If not managed properly, these conditions can hinder the achievement of sustainable city development. Therefore, an environmental approach in analyzing economic activities is crucial to understanding the reciprocal relationship between economic activity and environmental conditions (Paniccia and Baiocco, 2020; Mathisen et al., 2022). This analysis not only focuses on the spatial distribution of economic activities but also considers ecological impacts, supporting the creation of sustainable development. Previous studies have shown that the distribution pattern of economic activities tends to be clustered and influenced by factors such as accessibility, infrastructure, and spatial planning policies. Additionally, increased economic activity is often followed by environmental degradation (Dmytriyev et al., 2021; Aripin et al., 2023). However, research that specifically integrates spatial analysis of economic activities with environmental approaches in Bandar Lampung is still relatively limited.

Based on these points, this study aims to identify the locations and distribution patterns of economic activities in the form of markets, analyze the level of location suitability, examine the factors influencing their distribution, and evaluate their environmental impacts. Furthermore, this research also aims to provide environmentally based recommendations to support sustainable economic development. Thus, the results of this study are expected to serve as a basis for more targeted regional planning and assist local governments in managing economic development activities without neglecting environmental conservation. Therefore, research on the spatial distribution of economic activities with an environmental approach in Bandar Lampung City is important to conduct using Geographic Information System (GIS).

Research Method

The research method used in this study is a descriptive quantitative method. The quantitative research method is a study that aims to describe a phenomenon, event, symptom, or occurrence that happens factually, systematically, and accurately (Yuliani and Supriatna, 2023). This study aims to identify the locations and distribution patterns of market-based economic activities, analyze the level of location suitability, examine the factors influencing their distribution, and evaluate their impact on the environment. A population is the entire collection of objects that become the central focus of a study (Suriani and Jailani, 2023). In this study, the population consists of all traditional and modern markets in Bandar Lampung City. The number of modern markets in Bandar Lampung City is 330 units, and the number of traditional markets in Bandar Lampung City is 39 units. Thus, the total population is 369 units. As for the sample, it includes the entire population, which is also referred to as total sampling.

The variable in this study is the location suitability level of modern markets relative to traditional markets in Bandar Lampung City, which can be identified using buffering analysis on modern market locations against traditional markets in accordance with the Regional Regulation of Bandar Lampung City Number 3 of 2022. The following Figure 2.1 shows the research process carried out in the form of a flowchart.



Result and Discussion

A. Results

1. Economic Activities: Spatial Distribution of Traditional Markets in Bandar Lampung City

Traditional markets constitute one of the most important components of the urban economic system, serving as centers of local economic activities while simultaneously functioning as social spaces where community interactions have been maintained across generations (Thompson et al., 2020; Korsunova et al., 2022). Their role extends beyond facilitating commercial transactions, as they represent an integral part of the socio economic structure that sustains local livelihoods, supports small scale enterprises, and preserves long established cultural and trading traditions. Consequently, traditional markets contribute not only to the circulation of goods and services but also to the maintenance of social cohesion within urban communities (Kithan and Pamei, 2026).

As a general overview, Figure 1 illustrates the economic activities occurring in one of the traditional markets in Bandar Lampung City. The figure depicts a marketplace characterized by direct interactions between traders and consumers, where the bargaining process remains the dominant mechanism for determining commodity prices. Unlike modern retail systems that apply fixed pricing, bargaining in traditional markets reflects a unique socio economic relationship that encourages communication, trust building, and long term relationships between sellers and buyers. These interactions demonstrate that traditional markets function not merely as commercial centers but also as important social institutions that reinforce community relationships and strengthen the local economy.

Figure 1. Economic activities in a traditional market in Bandar Lampung City.

Figure 1 further demonstrates that traditional markets were selected as one of the principal variables in evaluating the spatial suitability of modern market locations in Bandar Lampung City. This consideration is based on the assumption that the establishment and expansion of modern markets are closely associated with the spatial distribution of existing traditional markets. In other words, the location of traditional markets provides an important reference for understanding whether modern markets complement, compete with, or potentially reduce the economic functions previously performed by traditional markets (Yaqin et al., 2023). Therefore, the spatial relationship between these two market types becomes a critical aspect of urban economic planning and sustainable commercial development.

To support this analysis, comprehensive and accurate spatial information regarding the distribution of traditional markets was required. Reliable spatial data enable researchers to evaluate the proximity between traditional and modern markets, identify potential spatial competition, and assess the accessibility of both market types from surrounding residential areas (Ellickson et al., 2020). Furthermore, detailed spatial information facilitates analysis of market service coverage and helps policymakers formulate more balanced retail development strategies.

According to secondary data obtained from the Bandar Lampung City Department of Trade in 2025, there are 39 traditional markets distributed throughout various districts of Bandar Lampung City. However, these administrative records were not directly incorporated into the analysis. Instead, a field verification process was conducted to confirm the existence of each traditional market and obtain precise geographic coordinates. This verification was considered essential because changes in market conditions, relocation, or discrepancies in administrative records may affect the accuracy of spatial analyses if not confirmed through direct observation.

Field observations were conducted using Google Earth to identify and verify the exact location of each market. Subsequently, the verified geographic coordinates were imported into ArcMap, where the spatial database was developed and analyzed using Geographic Information System (GIS) techniques. ArcMap facilitated the integration of spatial and attribute data, enabling the visualization of traditional market locations, the examination of their spatial patterns, and the assessment of their relationship with other urban features. The final output of this process was a detailed spatial distribution map illustrating the locations of traditional markets across Bandar Lampung City.

The mapping results reveal a distinct spatial pattern in which traditional markets are predominantly concentrated along the city's primary transportation corridors and major arterial roads (Hogba and Yiran, 2024). These locations generally exhibit high levels of accessibility due to their close proximity to public transportation routes, commercial centers, and densely populated residential areas. Such a distribution pattern indicates that accessibility remains one of the principal determinants influencing the establishment and long-term sustainability of traditional markets. From a geographical perspective, this spatial configuration reflects the tendency of traditional markets to develop in areas with high population mobility and significant economic activity. Markets located along major road networks are more easily reached by consumers from surrounding neighborhoods, thereby increasing customer flows and enhancing trading opportunities for local vendors. In addition, these strategic locations facilitate the distribution of agricultural products, household necessities, and other daily commodities from producers to consumers through relatively efficient transportation networks.

The observed distribution pattern also provides an important basis for investigating the spatial interaction between traditional and modern markets in Bandar Lampung City. Through Geographic Information System (GIS) based spatial analysis, the relative locations of modern markets can be compared with the existing distribution of traditional markets to determine whether modern retail development exhibits clustering, dispersion, or competitive proximity. Such analyses are essential for evaluating the potential impacts of modern retail expansion on traditional market sustainability, local economic resilience, and the equitable distribution of commercial services throughout the city. Moreover, understanding the spatial relationship between traditional and modern markets contributes to evidence based urban planning by providing policymakers with information necessary to regulate retail development, minimize spatial competition, and promote balanced commercial growth (Setiowati, 2025). These findings also support the formulation of policies aimed at preserving the economic role of traditional markets while accommodating the continued development of modern retail facilities in accordance with sustainable urban planning principles. The spatial distribution of modern market economic activities in Bandar Lampung City in 2025 is presented in Figure 2.

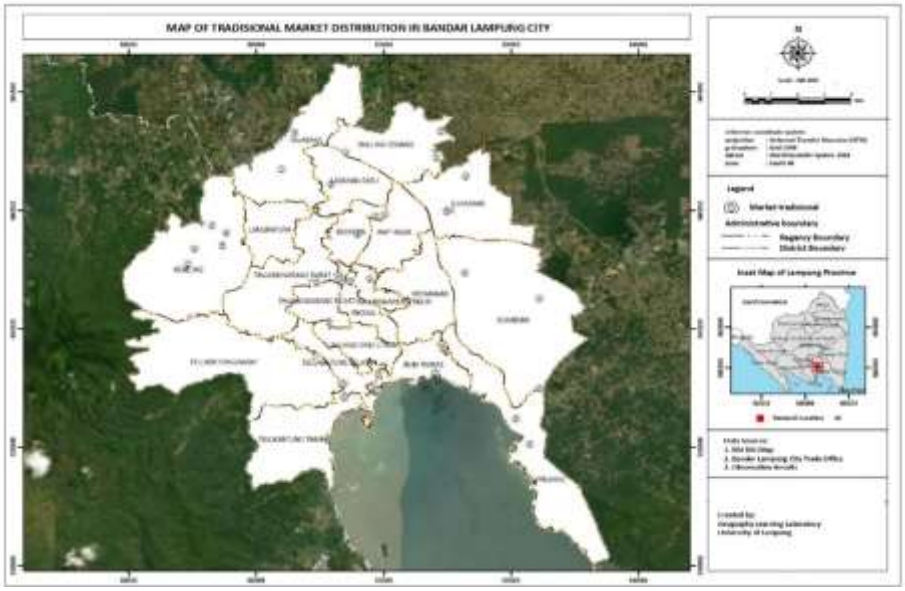


Figure 2. Spatial Distribution of Traditional Markets in Bandar Lampung City

Figure 2 illustrates the spatial distribution of traditional market economic activities across the districts of Bandar Lampung City, revealing considerable variation in the number of traditional markets among administrative areas. The distribution pattern indicates that traditional markets are not evenly dispersed throughout the city but instead tend to cluster in districts with relatively high levels of economic activity and accessibility. Among all districts, Kemiling and Tanjung Karang Pusat record the highest number of traditional markets, with five markets each, indicating their significant role as major centers of commercial activity within the city. These districts function as important trading hubs that serve not only local residents but also surrounding communities due to their strategic locations and well developed transportation

networks. Bumi Waras follows with four traditional markets, reflecting its substantial contribution to local retail activities and community-based commerce.

The next group consists of Panjang, Tanjung Senang, and Sukarame, each accommodating three traditional markets. These districts represent secondary commercial centers where traditional markets continue to play an important role in supplying daily necessities and supporting small scale economic activities. Meanwhile, Kedaton, Rajabasa, Sukabumi, Teluk Betung Selatan, and Teluk Betung Timur each contain two traditional markets, indicating a moderate level of market service provision within their respective administrative boundaries. The remaining districts, namely Enggal, Labuhan Ratu, Tanjung Karang Barat, Tanjung Karang Timur, Teluk Betung Barat, and Way Halim, each possess only one traditional market. Although fewer in number, these markets continue to perform essential economic functions by providing accessible trading facilities for nearby residents and supporting local micro, small, and medium sized enterprises (MSMEs).

Conversely, Kedamaian, Langkapura, and Teluk Betung Utara do not have any traditional markets. From a spatial perspective, this absence does not necessarily indicate insufficient commercial services. Instead, it can be explained by the geographical proximity of these districts to neighboring districts where active traditional markets already exist. Consequently, residents can conveniently access nearby markets without requiring additional market facilities within their own administrative areas. Furthermore, differences in land use patterns, population density, urban growth dynamics, and the availability of suitable commercial land may have influenced the absence of traditional markets in these districts. Areas dominated by residential developments, government facilities, conservation zones, or other non commercial land uses generally exhibit lower demand for establishing formal traditional markets. Likewise, rapid urban expansion and changing patterns of commercial development may shift economic activities toward adjacent districts with more strategic locations.

Within the framework of an urban service system, the distribution of traditional markets is primarily determined by service coverage rather than administrative boundaries. A single traditional market is often capable of serving residents from multiple neighboring districts because consumers tend to select shopping destinations based on accessibility, travel time, transportation availability, product diversity, and price competitiveness rather than district boundaries. Therefore, an unequal spatial distribution of traditional markets does not necessarily imply unequal access to commercial services but instead reflects the functional organization of urban economic activities. Overall, the observed spatial distribution demonstrates that traditional markets tend to concentrate in districts characterized by high accessibility, dense population, and intensive economic activities. This spatial pattern provides an important foundation for evaluating the interaction between traditional and modern markets, particularly in assessing whether the expansion of modern retail establishments overlaps with or complements the existing service areas of traditional markets.

2. Economic Activities: Spatial Distribution of Modern Markets in Bandar Lampung City

Modern markets represent a more contemporary form of retailing that differs substantially from traditional markets in terms of operational systems, management practices, physical infrastructure, and customer service. Their emergence reflects the transformation of urban commercial systems driven by economic development, changing consumer preferences, technological advancement, and increasing demands for shopping convenience. Unlike traditional markets, modern markets generally employ a self service retail system, allowing customers to independently select products from organized display shelves without intensive interaction with sales personnel. Every product is accompanied by a fixed price label, eliminating the bargaining process that characterizes traditional market transactions. This pricing mechanism enhances transparency, minimizes transaction time, and creates a standardized shopping environment for consumers.

In addition, modern markets are designed with systematic layouts that prioritize efficiency, cleanliness, comfort, and accessibility. Merchandise is arranged according to product categories, facilitating easier product selection and improving customer convenience. Shopping aisles are typically wider and more organized, while environmental conditions including lighting, air conditioning, sanitation, and waste management are maintained according to standardized operational procedures. These characteristics contribute to a shopping experience that emphasizes convenience, safety, and service

quality. All commercial activities are conducted within enclosed buildings equipped with professional management systems, electronic payment facilities, inventory control technologies, surveillance cameras (CCTV), and computerized cashier systems. Such facilities reflect the application of modern retail management principles that emphasize operational efficiency, product quality assurance, consumer protection, hygiene, and transaction security.

The development of modern markets represents the evolution of conventional trading systems into organized retail formats that integrate business management, logistics, information technology, and customer oriented services. Compared with traditional markets, modern retail businesses generally possess stronger financial resources, more sophisticated supply chain management, standardized operating procedures, and extensive marketing strategies. These competitive advantages enable modern markets to provide consistent product availability, standardized pricing, and improved shopping environments.

In Bandar Lampung City, the development of modern markets has accelerated significantly during the last decade. This rapid expansion is reflected by the increasing number of franchised convenience stores distributed throughout the city, accompanied by the establishment of supermarkets, hypermarkets, and shopping centers in strategically selected locations. Most of these retail facilities are situated along major arterial roads, commercial corridors, residential growth areas, and transportation hubs, enabling them to attract large numbers of consumers from various parts of the city. The rapid expansion of modern retailing has transformed the spatial structure of urban commercial activities. Rather than serving only as shopping destinations, modern markets increasingly function as service centers that integrate retail, financial services, food and beverage outlets, and recreational facilities. Consequently, they have become important components of Bandar Lampung City's urban economy.

The presence of modern markets generates both positive and negative implications for urban economic development. On the positive side, they improve consumer accessibility to goods, offer greater shopping convenience, provide standardized product quality, extend operating hours, and create new employment opportunities in retail management, logistics, distribution, and supporting services. Furthermore, modern retail establishments contribute to regional economic growth through tax revenues, business investment, and increased commercial activities. However, the expansion of modern markets also presents significant challenges for the sustainability of traditional markets. Their superior facilities, competitive pricing strategies, longer operating hours, and more comfortable shopping environments may shift consumer preferences away from traditional markets. This competitive relationship is particularly evident when modern markets are established in close proximity to existing traditional markets, potentially reducing customer traffic and sales revenues among traditional vendors.

Consequently, understanding the spatial relationship between traditional and modern markets becomes an essential aspect of urban commercial planning. Geographic Information System (GIS) based spatial analysis enables researchers to evaluate whether the distribution of modern markets complements existing commercial service areas or creates excessive spatial competition with traditional markets. Such analyses provide valuable evidence for policymakers in designing balanced retail development policies that promote economic growth while preserving the socio economic functions of traditional markets.

Figure 3. Economic Activities in Modern Markets in Bandar Lampung City

Figure 3, illustrates the characteristics of economic activities taking place in a modern market in Bandar Lampung City. In contrast to traditional markets, the modern market shown in the figure exhibits a well organized retail environment characterized by systematic product displays, standardized pricing, high levels of cleanliness, and the implementation of a self service shopping system. These characteristics reflect the transformation of urban retailing from conventional market systems toward modern retail formats that emphasize efficiency, convenience, and standardized customer services.

The mapping of modern markets was conducted to identify their spatial distribution throughout Bandar Lampung City and to examine their spatial relationship with the existing traditional markets. The rapid expansion of modern retail establishments over recent years has become an important issue in urban commercial development because it may alter the balance of the local trading system. This situation becomes particularly significant when newly established modern markets are located within proximity to traditional markets that have long served surrounding communities. Such spatial proximity may intensify market competition by reducing the customer base of traditional markets, influencing consumer shopping behavior, and potentially changing the commercial structure of the surrounding area.

To investigate these spatial dynamics, this study employed a Geographic Information System (GIS) approach, which enables detailed identification, visualization, and analysis of the spatial distribution of modern markets. GIS provides an effective analytical framework for evaluating the appropriateness of market locations, measuring distances between traditional and modern markets, identifying potential overlaps in service areas, and assessing the extent to which modern retail development may influence the commercial functions of nearby traditional markets. Compared with conventional descriptive approaches, GIS based spatial analysis offers more objective and measurable information for understanding urban retail patterns and supporting evidence-based planning.

After the verification process was completed and all spatial information had been validated, the geographic coordinates were exported into Keyhole Markup Language (KML) format. The KML files were then imported into ArcGIS, where the spatial database was processed for advanced GIS analysis. ArcGIS was used to visualize the distribution of modern markets, analyze spatial patterns, evaluate accessibility, and produce a comprehensive thematic map illustrating the overall distribution of modern retail establishments across Bandar Lampung City. Therefore, understanding the spatial distribution of modern markets is fundamental for evaluating the balance of urban commercial development. GIS based spatial analysis provides valuable information for identifying areas experiencing excessive retail concentration, evaluating service coverage, assessing potential spatial competition, and supporting urban planning policies aimed at achieving a more balanced and sustainable retail system. The spatial distribution of modern markets in Bandar Lampung City for 2025 is presented in Figure 4.

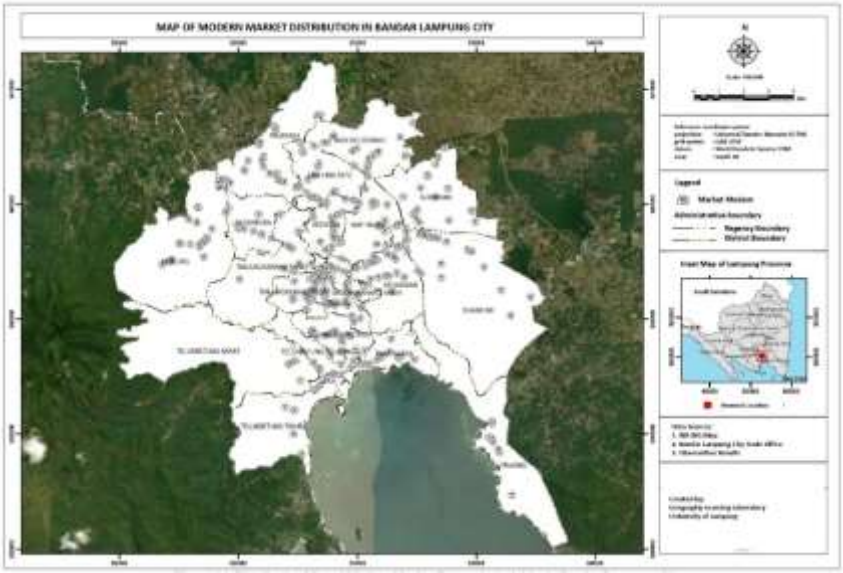


Figure 4. Spatial Distribution of Modern Markets in Bandar Lampung City

Figure 4, illustrates the spatial distribution of modern markets across Bandar Lampung City in 2025. The distribution pattern reveals a distinct concentration of modern retail establishments in the central and eastern parts of the city, particularly within the districts of Kedaton, Tanjung Karang Pusat, Kedamaian, and Rajabasa. These districts represent the primary commercial and service centers of Bandar Lampung, characterized by relatively high population densities, intensive economic activities, and well developed transportation infrastructure. Consequently, they provide highly favorable conditions for the establishment and expansion of modern retail businesses.

The concentration of modern markets in these districts indicates that retail location decisions are strongly influenced by the economic potential of the surrounding area. From the perspective of economic geography, businesses generally seek locations with high market accessibility, substantial consumer demand, and continuous economic activity. Areas that combine these characteristics offer greater opportunities for attracting customers, increasing sales volumes, and maximizing business profitability. Therefore, the observed clustering pattern reflects rational location selection strategies adopted by modern retail operators to optimize their market performance. Furthermore, the concentration of modern markets within these strategic districts demonstrates the close relationship between urban development and the evolution of retail systems. As urbanization progresses and commercial activities become increasingly concentrated, modern retail establishments tend to locate in areas where population mobility, purchasing power, and consumer demand are consistently high. These locations function not only as shopping destinations but also as economic service centers that support a wide range of commercial and social activities throughout the city.

Areas characterized by high economic activity and dense populations generally generate complex impacts on urban development, producing both positive and negative consequences. From a positive perspective, such areas often become major engines of regional economic growth. The concentration of commercial activities stimulates the expansion of trade, service industries, and small scale enterprises due to continuously increasing market demand. The presence of numerous consumers within relatively limited geographic areas creates favorable conditions for business expansion and encourages the establishment of new commercial enterprises.

This dynamic economic environment also attracts both public and private investment. As commercial opportunities increase, investors become more willing to develop retail facilities, office buildings, commercial complexes, and supporting infrastructure. Such investments subsequently generate additional employment opportunities in various sectors, including retail, transportation, logistics, hospitality, finance, and public services. As employment opportunities expand, household income tends to increase, thereby strengthening local purchasing power and creating a multiplier effect that

further stimulates economic development. In addition, areas experiencing intensive economic growth generally benefit from improvements in urban infrastructure. Road networks are expanded and upgraded to accommodate increasing traffic volumes, while public transportation systems become more comprehensive to facilitate population mobility. Public facilities such as parking areas, pedestrian pathways, drainage systems, street lighting, and utility networks are also typically improved to support both commercial activities and daily urban life. These infrastructure developments enhance accessibility and contribute to greater efficiency in the movement of goods, services, and people throughout the city.

The concentration of commercial activities further encourages the emergence of complementary economic functions. Modern markets often stimulate the development of restaurants, financial institutions, pharmacies, entertainment facilities, educational services, and various other commercial establishments within the surrounding area. Consequently, these districts evolve into integrated urban activity centers where multiple economic functions coexist and reinforce one another, contributing to broader urban economic development.

Despite these economic advantages, high concentrations of population and commercial activities also create several challenges for sustainable urban development. Increasing development intensity places considerable pressure on urban land resources, often resulting in rapid land use conversion from agricultural land, open spaces, or residential areas into commercial and mixed use developments. Without effective spatial planning and land use regulation, such transformations may occur in an uncoordinated manner, potentially reducing environmental quality and limiting future development opportunities. Another consequence of increasing commercial concentration is the growing burden placed on urban transportation systems. As the number of commercial establishments and consumers continues to increase, traffic congestion becomes more frequent, particularly during peak shopping hours. Higher traffic volumes may reduce transportation efficiency, increase travel time, elevate fuel consumption, and contribute to greater air pollution. In rapidly growing urban centers, infrastructure development often struggles to keep pace with increasing demand, creating disparities between urban growth and the availability of adequate public facilities.

From an economic perspective, high concentrations of modern retail establishments also intensify competition among businesses. Retail enterprises compete not only in terms of pricing strategies but also through product diversity, customer service quality, promotional activities, technological innovation, and location advantages. While such competition may improve consumer welfare by expanding product choices and encouraging service improvements, it may simultaneously place substantial pressure on traditional markets and small independent retailers. Competition between modern and traditional markets becomes particularly significant when both types of retail establishments serve overlapping market areas. Modern markets generally possess competitive advantages through standardized management systems, integrated supply chains, advanced inventory management, longer operating hours, and more comfortable shopping environments. These advantages may gradually shift consumer preferences toward modern retail formats, potentially reducing customer visits and sales revenues among nearby traditional markets. Consequently, unequal competitive conditions may contribute to disparities in business development and threaten the long term sustainability of traditional markets as important components of the local economy.

High levels of urban concentration also generate environmental challenges. Increasing commercial activities are commonly associated with greater solid waste generation, higher energy consumption, increased vehicle emissions, and elevated levels of environmental pollution. Simultaneously, continuing urban expansion frequently reduces the availability of green open spaces that provide important ecological functions such as temperature regulation, rainwater infiltration, biodiversity conservation, and recreational opportunities. If these environmental pressures are not effectively managed through sustainable urban planning policies, they may diminish urban livability and compromise the long term sustainability of the city's development. Therefore, districts characterized by intensive economic activities play a dual role within the urban system. On one hand, they function as major drivers of economic growth by attracting investment, creating employment opportunities, and supporting commercial expansion. On the other hand, they require comprehensive spatial planning and effective urban management to minimize negative externalities associated with excessive development intensity. Sustainable urban development therefore depends on achieving an appropriate balance between economic growth, environmental protection, infrastructure capacity, and social equity.

In contrast, the western and southern parts of Bandar Lampung City, particularly Teluk Betung Barat and Panjang, exhibit a relatively lower density of modern markets. This pattern is reflected by the greater distances separating individual retail outlets and the lower concentration of commercial establishments compared with the central and eastern districts. Several factors may explain this spatial distribution, including lower population densities, reduced commercial intensity, differences in land use patterns, topographic conditions, and relatively lower accessibility. Consequently, these districts have attracted fewer modern retail investments than the city's primary commercial centers.

The spatial distribution illustrated in Figure 4 also demonstrates a strong relationship between the location of modern markets and the city's primary transportation network, consistent with the findings of Sastrawati and Akil (2025). Most modern retail establishments are strategically located along arterial and collector roads that experience high traffic volumes and provide excellent accessibility for both private and public transportation. Such transportation corridors facilitate efficient movement of consumers, employees, and goods while simultaneously increasing the commercial visibility of retail establishments. This relationship can be clearly observed along the Soekarno Hatta Road and Zainal Abidin Pagar Alam Road corridors, which function as major transportation arteries connecting various commercial, educational, governmental, and residential centers throughout Bandar Lampung City. These corridors experience continuous flows of people and vehicles throughout the day, making them highly attractive locations for retail investment. Businesses located along these routes benefit from increased customer exposure, improved accessibility, and efficient distribution logistics.

From the perspective of retail location theory and urban geography, this distribution pattern demonstrates that accessibility remains one of the most influential determinants of modern retail location. Modern markets are generally established in locations that maximize customer convenience, reduce travel time, and ensure high levels of visibility to passing traffic. The close association between retail distribution and transportation infrastructure indicates that road networks function not merely as physical infrastructure but also as fundamental drivers shaping the spatial organization of commercial activities within Bandar Lampung City. Consequently, future urban planning and commercial development policies should continue to integrate transportation planning with retail spatial planning to promote balanced, efficient, and sustainable urban economic development.

3. Policy Analysis of the Spatial Suitability of Modern Market Locations Relative to Traditional Markets Based on the Regional Regulation of Bandar Lampung City

The policy analysis concerning the spatial suitability of modern market locations in relation to traditional markets constitutes a critical stage in evaluating the implementation of urban spatial planning regulations governing the commercial sector (Yuliani et al., 2016; Majid et al., 2026). Within the context of rapidly expanding modern retail development, spatial planning policies play an essential role in maintaining a balanced urban commercial structure while safeguarding the sustainability of traditional markets, which continue to serve as important economic and social institutions within local communities. In Bandar Lampung City, the legal framework regulating the spatial relationship between modern and traditional markets is established under Regional Regulation (Peraturan Daerah) of Bandar Lampung City No. 3 of 2022. This regulation stipulates the minimum allowable distance between newly established modern markets and existing traditional markets as an instrument of spatial control and commercial zoning. Specifically, the regulation requires every modern market to be located at least 250 meters away from any pre existing traditional market.

The establishment of this minimum distance requirement is intended to preserve adequate operational space for traditional markets, thereby enabling them to maintain their competitiveness, retain their customer base, and continue performing their socio economic functions amid the rapid expansion of the modern retail sector. Traditional markets are generally characterized by small scale traders, locally owned businesses, and informal economic activities that possess relatively limited competitive capacity compared with modern retail chains. Consequently, spatial regulation serves not only as a land use planning instrument but also as a public policy mechanism designed to protect community based economic systems and promote equitable commercial development. From the perspective of urban spatial planning, the minimum distance requirement functions as a spatial control instrument that seeks to balance modern economic growth

with the sustainability of the people's economy. Rather than restricting commercial investment, the regulation aims to ensure that modern retail expansion occurs in an orderly manner without generating excessive spatial competition that could undermine the long term viability of traditional markets. Such policies reflect the broader principle of sustainable urban development, whereby economic growth should be accompanied by social equity and balanced spatial organization.

To evaluate the implementation of this regulation, spatial analyses were conducted using Geographic Information System (GIS) techniques based on the verified database of traditional and modern markets compiled during field surveys. After completing the data collection and verification process, an overlay analysis was first performed to examine the spatial relationship between the two categories of markets throughout Bandar Lampung City. The overlay analysis involved integrating the spatial layers representing traditional markets and modern markets into a single geographic database. This procedure enabled the identification of their relative spatial positions and provided an initial understanding of the distribution patterns of both market types. Through this approach, researchers were able to determine whether modern markets tended to cluster around existing traditional markets or whether they were distributed independently throughout the urban area.

Following the overlay process, a buffer analysis was conducted by generating a 250-meter radius around every traditional market in accordance with the provisions stipulated in Regional Regulation No. 3 of 2022. Buffer analysis represents one of the most widely applied GIS techniques for evaluating spatial proximity because it allows researchers to delineate influence zones surrounding specific geographic features. In this study, the buffer zones represented legally protected areas within which the establishment of new modern markets should not occur. Each modern market was subsequently evaluated according to its distance from the nearest traditional market (Riva'i et al., 2021; Ahmad and Fikriya, 2023). The GIS analysis automatically calculated whether each modern market was located inside or outside the prescribed 250 meter buffer zone. This analytical procedure provides an objective and quantitative assessment of regulatory compliance while minimizing subjectivity in evaluating the spatial suitability of retail locations.

Modern markets situated within a distance of less than 250 meters from the nearest traditional market were classified as non compliant with the regional regulation because their locations violated the prescribed minimum distance requirement. Conversely, modern markets located outside the 250 meter buffer zone were categorized as compliant, indicating that their establishment satisfied the spatial planning provisions established by the local government. The results of the buffer analysis are presented spatially in Figure 4.5, which provides a comprehensive visualization of regulatory compliance across Bandar Lampung City. The map classifies all identified modern markets into two principal categories based on their conformity with the legally required minimum distance.

To facilitate interpretation, different colored point symbols were employed to distinguish between compliant and non-compliant locations. Green point symbols represent modern markets that satisfy the minimum distance requirement established by the regional regulation, indicating that their locations conform to the applicable spatial planning policy. In contrast, red point symbols indicate modern markets situated within the restricted 250 meter buffer zone surrounding traditional markets and are therefore categorized as non-compliant with the current regulation. The thematic representation produced through GIS significantly enhances the interpretation of spatial policy implementation because it enables policymakers to identify clusters of regulatory violations, evaluate the geographical distribution of compliant and non compliant markets, and prioritize areas requiring further monitoring or regulatory intervention. Compared with conventional statistical summaries, spatial visualization provides a more comprehensive understanding of how regulatory compliance varies across different parts of the city.

Based on the results of the spatial analysis, 330 modern markets were successfully identified throughout Bandar Lampung City. Among these establishments, 292 modern markets, representing 88.5% of the total, comply with the minimum distance requirement specified in Regional Regulation No. 3 of 2022. These findings indicate that the majority of modern retail establishments have been developed in locations consistent with the city's spatial planning policy and commercial zoning regulations. Meanwhile, 38 modern markets, equivalent to approximately 11.5% of the total inventory, were found to be located within 250 meters of the nearest traditional market. These establishments therefore fail to satisfy the minimum separation distance required by the regional regulation and are classified as spatially non compliant.

From a quantitative perspective, the findings demonstrate that the implementation of the regional regulation has generally been effective, as nearly nine out of every ten modern markets comply with the prescribed spatial requirements. This high level of compliance suggests that spatial planning policies have contributed to regulating the distribution of modern retail establishments and reducing excessive spatial competition with traditional markets. Nevertheless, the presence of 38 non compliant modern markets remains a significant concern from both planning and regulatory perspectives. Although they represent a relatively small proportion of the total number of modern markets, these establishments indicate that regulatory implementation has not yet been fully achieved. Their existence highlights the need for continuous monitoring, periodic evaluation, and strengthened enforcement of spatial planning regulations to ensure consistent policy implementation throughout the city. From an urban planning perspective, non compliant market locations may generate overlapping commercial service areas between modern and traditional markets. Such overlap has the potential to intensify competition for consumers, particularly when both market types offer similar categories of daily necessities. Given the superior capital resources, standardized management systems, and marketing capabilities of modern retail businesses, traditional markets located within these overlapping service areas may experience declining customer numbers, reduced sales revenues, and weakened long-term competitiveness. The spatial distribution of non compliant modern markets is not concentrated in a single location but is dispersed across 12 districts: Tanjung Senang, Tanjung Karang Barat, Labuhan Ratu, Rajabasa, Kedaton, Teluk Betung Timur, Tanjung Karang Timur, Teluk Betung Selatan, Enggal, Kemiling, Tanjung Karang Pusat, and Sukabumi. The wide geographic distribution of these cases indicates that regulatory inconsistencies occur across multiple parts of the city rather than being confined to a particular commercial center.

This dispersed spatial pattern suggests that non compliance may be influenced by multiple factors, including the rapid expansion of modern retail investment, differences in historical establishment periods, changing urban land use patterns, and limitations in regulatory monitoring during the licensing process. Consequently, future commercial planning should emphasize stronger coordination among spatial planning agencies, licensing authorities, and trade institutions to ensure that new retail developments remain consistent with both land use planning objectives and local economic protection policies. Overall, the GIS based overlay and buffer analyses provide robust empirical evidence for assessing the effectiveness of spatial planning policies governing the relationship between modern and traditional markets in Bandar Lampung City. The integration of Geographic Information Systems with regulatory evaluation enables objective measurement of policy compliance, facilitates the identification of priority areas requiring intervention, and provides scientifically grounded information to support future revisions of commercial spatial planning policies. Ultimately, this analytical approach contributes to the broader objective of achieving a balanced urban retail system that simultaneously promotes modern economic development while preserving the sustainability and socio economic functions of traditional markets.

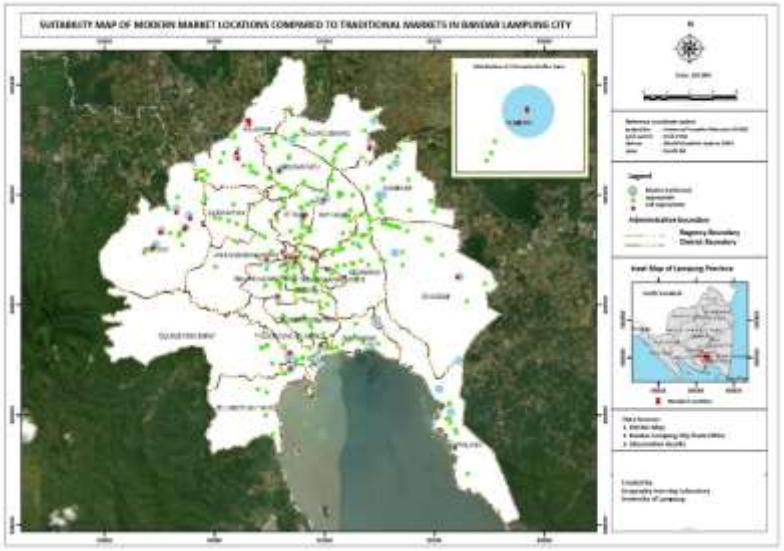


Figure 5, shows the distribution of modern market compliance with spacing regulations in each district.

B. Discussion

Economic activity encompasses all human activities undertaken to satisfy individual and societal needs through the processes of production, distribution, and consumption (Albareda and Sison, 2020; Sima et al., 2020). These three interconnected components constitute the foundation of every economic system, determining how goods and services are created, transferred, and ultimately consumed by society. In practice, economic activities are closely associated with the existence of markets, which function as institutional and spatial arenas where producers, traders, and consumers interact (González, 2020; Flanagan et al., 2023). Markets therefore serve not only as places for commercial transactions but also as fundamental components of urban and regional economic systems that facilitate the circulation of goods, capital, information, and social interactions.

Broadly, markets can be classified into two principal categories, namely traditional markets and modern markets, each possessing distinctive characteristics, operational mechanisms, strengths, and limitations in supporting economic activities (Vivin and Adinugraha 2022; Wahyuni et al., 2026). Although both market types perform similar economic functions, they differ substantially in terms of organizational structure, management systems, supply chains, consumer behavior, and spatial characteristics. Understanding these differences is essential for evaluating the transformation of urban retail systems and developing balanced commercial policies that accommodate both traditional and modern forms of trade.

Economic activities in traditional markets are generally conducted through direct and relatively simple transactions. Most commodities sold in these markets originate from small-scale producers, including farmers, fishermen, livestock breeders, artisans, and household industries, whose production processes typically operate on small to medium scales (Middelberg, 2013; Rudolph and Muchesa, 2023). Consequently, traditional markets play an important role in integrating local production systems with local consumption by providing accessible marketing channels for community based producers.

The distribution process within traditional markets is relatively short and less complex than that of modern retail systems. Traders frequently purchase products directly from producers or through a limited number of intermediaries before selling them to consumers (Mariyono et al., 2020; Sharp, 2021). This relatively short supply chain reduces distribution costs and allows locally produced goods to reach consumers more efficiently. Fresh agricultural products, fish, meat, vegetables, fruits, and other daily necessities are therefore able to maintain relatively high levels of freshness while supporting local agricultural economies.

From the consumption perspective, traditional markets provide consumers with considerable purchasing flexibility. Customers are able to purchase commodities according to their immediate needs, including very small quantities, which is particularly important for lower income households (Arunachalam et al., 2020). One of the defining characteristics of traditional markets is the intensive interaction between sellers and buyers through bargaining (Hendershott et al., 2020). Price negotiation not only determines the final transaction price but also strengthens interpersonal relationships, builds trust, and reinforces social cohesion within local communities (Ruben, 2024). Consequently, traditional markets function simultaneously as economic institutions and as social spaces that preserve local cultural values and community identity.

Traditional markets possess several important advantages. They generally offer relatively affordable prices, flexible transaction mechanisms, and broad opportunities for micro, small, and medium sized enterprises (MSMEs) to participate in local economic activities (Xiong, 2024). Their accessibility enables small entrepreneurs with limited capital to engage in commercial activities without substantial financial barriers. Moreover, direct communication between traders and consumers contributes to stronger social relationships and encourages the circulation of economic benefits within local communities.

Despite these advantages, traditional markets also face numerous challenges. Physical conditions are often less organized, sanitation standards may be relatively low, and supporting facilities such as parking areas, waste management systems, and public amenities are frequently inadequate. Product quality and packaging may also vary considerably because goods are supplied by numerous independent producers without standardized quality control. Furthermore, compared with modern retail establishments, traditional markets generally provide lower levels of shopping comfort, operational efficiency, and service standardization (Behnke and Janssen, 2020; Katsikouli et al., 2021). These limitations increasingly affect consumer preferences as urban populations become more concerned with convenience and efficiency.

In contrast, modern markets operate through highly organized and professionally managed retail systems. Products are typically manufactured on a large scale by established companies that apply standardized production processes and quality assurance systems. Consequently, goods sold in modern markets generally exhibit consistent quality, standardized packaging, and reliable product availability (Li et al., 2020). The distribution network supporting modern markets is considerably more complex than that of traditional markets. Products move through structured supply chains involving manufacturers, regional distributors, wholesalers, centralized warehouses, and advanced logistics systems before reaching retail outlets (Kretschmer et al., 2022). Such integrated distribution systems enhance inventory management, reduce stock shortages, and improve operational efficiency throughout the retail network.

Modern markets also provide consumers with standardized shopping experiences. Customers independently select products using self service systems, while product prices are displayed clearly through fixed price labels, eliminating the need for bargaining. Payment transactions are supported by various digital technologies, including debit cards, credit cards, electronic payment systems, and digital wallets, thereby increasing transaction speed and convenience. The primary advantages of modern markets include clean and comfortable shopping environments, orderly product arrangements, reliable product quality, and a wide variety of merchandise. Standardized operational procedures ensure consistent customer service, while technological innovations improve transaction efficiency and inventory management (Riviera and Fauzi, 2022). These characteristics have contributed significantly to changing consumer behavior, particularly among urban populations seeking convenience, accessibility, and time efficiency.

Nevertheless, modern markets also exhibit several limitations. Product prices are often relatively higher than those found in traditional markets due to operational costs and corporate pricing strategies. In addition, interactions between sellers and consumers are generally minimal because transactions rely primarily on self service systems (Chang and Sokol, 2022). Modern retail expansion may also reduce economic opportunities for small independent traders because the sector is increasingly dominated by large corporations possessing greater financial resources, stronger supply chains, and more sophisticated marketing capabilities.

Overall, both traditional and modern markets perform complementary roles within the urban economy. Traditional markets make substantial contributions to social cohesion, local economic empowerment, and the sustainability of community based enterprises. Conversely, modern markets provide higher levels of operational efficiency, convenience, technological integration, and standardized services. Rather than viewing these market types as mutually exclusive competitors, sustainable urban development requires their coexistence within a balanced commercial system that accommodates diverse consumer needs while preserving inclusive economic opportunities for all stakeholders.

Economic activities occurring in both traditional and modern markets should not be examined solely through the classical economic framework of production, distribution, and consumption (Clement and Zhou, 2026). Equally important is the spatial dimension of these activities, particularly the geographical distribution of markets and the use of Geographic Information Systems (GIS) to analyze their spatial characteristics (Cellmer et al., 2020). Economic activities are inherently spatial because their performance depends on location, accessibility, transportation networks, population distribution, and surrounding land use characteristics. In general, spatial distribution refers to the arrangement of phenomena or activities across geographic space. Within the context of retail systems, spatial distribution describes the locations of traditional and modern markets, their distribution patterns, and their relationships with demographic characteristics, transportation accessibility, land use patterns, and regional economic conditions (Raza et al., 2022). Analyzing spatial location

preferences for urban activities using mode dependent accessibility with integrated land-use–transport models. Land, 11(8), 1139. These spatial relationships influence market accessibility, commercial competitiveness, service coverage, and consumer behavior.

Traditional markets are generally distributed more evenly throughout urban neighborhoods, suburban settlements, and rural communities because they are closely associated with local production areas and the daily consumption needs of surrounding residents. Their locations are typically determined by community accessibility rather than commercial profitability alone, allowing them to function as neighborhood service centers supporting local economic activities. In contrast, modern markets tend to cluster within urban centers and economically strategic areas characterized by high purchasing power, excellent transportation infrastructure, dense populations, and intensive commercial activities. Such spatial concentration reflects the location strategies of modern retail businesses, which seek to maximize customer accessibility and commercial visibility while optimizing operational efficiency and market potential.

The spatial relationship between traditional and modern markets can be effectively examined using Geographic Information Systems (GIS), a technology designed to collect, manage, analyze, and visualize geographically referenced data. GIS enables researchers to integrate spatial coordinates with attribute information, producing comprehensive digital maps that reveal patterns of market distribution and spatial interaction (Li et al., 2020; Vysotskyi, 2023). Through GIS based analyses, researchers can identify clusters of traditional and modern markets, evaluate their accessibility, measure inter market distances, and examine relationships between retail locations and supporting infrastructure such as road networks, residential areas, commercial districts, and public facilities. GIS also facilitates advanced spatial analyses including overlay, buffer, network, and proximity analyses that support evidence-based evaluation of urban commercial systems and spatial planning policies.

Ultimately, spatial distribution analysis provides valuable insights into how retail activities are organized geographically, while Geographic Information Systems serve as powerful analytical tools for visualizing and interpreting these spatial patterns. The integration of spatial analysis into economic studies enables governments, planners, and business stakeholders to make more informed decisions regarding commercial development, infrastructure investment, and urban land use planning. From a policy perspective, GIS based spatial analysis provides scientific evidence for balancing the expansion of modern retail with the preservation of traditional markets. Such analyses assist policymakers in identifying appropriate locations for future retail development, preventing excessive spatial competition, protecting community based economic institutions, and ensuring equitable access to commercial services across urban areas. Consequently, integrating spatial analysis with urban economic planning contributes to the development of a more efficient, inclusive, and sustainable retail system that simultaneously supports economic growth, social welfare, and long-term urban sustainability.

Conclusion

Based on the findings of this study, which employed spatial analysis using a Geographic Information System (GIS) and an environmental approach to assess the locational suitability of modern markets in relation to traditional markets in Bandar Lampung City, it can be concluded that the buffer analysis with a radius of 250 meters revealed that, of the total 330 registered modern markets, 292 units (88.5%) comply with the provisions stipulated in Bandar Lampung City Regional Regulation Number 3 of 2022. Meanwhile, the remaining 38 units (11.5%) do not comply with the regulation, as they are located within 250 meters of traditional markets. These findings indicate that, overall, the level of compliance with the minimum distance requirement is relatively high. Nevertheless, several modern market locations still fail to meet the applicable regulatory standards.

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