

The Influence of Land Use Patterns on Urban Commercial Street Distribution

Doudou Chen *

Faculty of Humanities and Social Sciences, University of Nottingham Ningbo China, Ningbo, 315100, China

* Corresponding Author Email: hmydc4@nottingham.edu.cn

Abstract. This study examines the relationship between urban land use patterns and the spatial distribution of commercial streets. Firstly, outline the basic land use categories such as residential and commercial areas, and then analyze how these areas collectively affect the city. Commercial streets have different classifications, and emerging models reflect potential commercial diversity. This article draws on urban economic theory, especially agglomeration economy theory, to explain the agglomeration effect of retail clusters. This centralized space not only reduces operating expenses, but also enhances customer attraction. Further investigation revealed the relationship between land use policies and commercial development. Some places designate zones to guide retail clusters to specific areas, thereby amplifying the agglomeration effect through the shared resources of the clustered retail industry and attracting consumers. Transportation infrastructure has become another key factor. Streets with high transportation connectivity, especially those near bus hubs or subway stations, continue to develop into vibrant commercial corridors. The study ultimately indicates that the combination of commercial zoning and transportation planning is a major contributor to improving urban economic performance. These findings provide practical insights for urban designers.

Keywords: Land Use Structure, Commercial Street Distribution, Urban Economic Output.

1. Introduction

Nowadays, cities around the world are expanding at an astonishing pace. In this situation, although the layout of commercial streets may seem like a small part, it is actually one of the most decisive factors shaping urban life. A well-designed street not only provides goods and services, but also creates employment opportunities, promotes socialization, and injects vitality into the community. However, if made wrong, it can lead to many negative consequences, such as traffic paralysis, incorrect resource allocation, and ultimately a decline in economic vitality and residents' quality of life [1].

However, there is a significant gap between the city planners hope for and reality. We have seen this in places like Lisbon, where the rapid expansion of retail stores has flooded historic streets, leading to impossible traffic and rent increases, and instead squeezing out long-standing local businesses, leaving some areas of the city disconnected from economic opportunities. These are not just ordinary failures, but also reveal deep-seated mismatches. This forces people to raise a more fundamental question: how do decisions on land use - where to build what - affect the fate of commercial streets? This study aims to unravel this mystery by studying the symbiotic relationships - sometimes concerning - between different regions. How do residential areas truly affect nearby commercial centers? What is the practical role of convenient transportation in creating or stifling successful business clusters? The value of this study is twofold: it attempts to uncover the hidden mechanisms by which land types and allocation guide commercial growth, while providing practical, evidence-based insights for planners. The ultimate goal is to help design urban spaces that not only prioritize economic efficiency, but also truly serve the people living in them [2].

2. Literature Review

2.1. Land Use Structure

Urban land is divided into different functional zones - residential, commercial, industrial, and public - each of which has a distinct impact on urban development. Residential areas primarily focus on living, closely related to residents and residential properties, while commercial activities are concentrated around transportation hubs, as exemplified by the retail density near Guangzhou's Beijing Road subway station. Industrial zones are usually located along freight corridors, bringing many environmental challenges including river pollution [3]. Although public spaces are economically marginal, they remain crucial for community interaction. Furthermore, allocating appropriate space is essential for sustainable environmental development. For instance, green infrastructure can mitigate floods and improve air quality, while comprehensive planning helps reduce soil erosion. However, poor planning can exacerbate negative outcomes, a typical example being the correlation between the expansion of warehouses in the United States and the increase in transportation emissions. Transportation design also influences land use: bicycle lanes are often associated with increased retail activity, while suburbs housing residents with dementia require barrier-free access to be designed [4].

Urban land use not only promotes development but also poses challenges. In Accra, road connections to commercial centers such as markets have stimulated economic growth and employment, while industrial areas have provided many new job opportunities. The mixed-use model, with Seoul's integrated districts being a key example, effectively reduces commuting demand and is an important means of building a vibrant city [5]. Technological advancements, including satellite monitoring and proximity logistics, have further improved land use efficiency, and a flexible zoning framework is more adaptable than a rigid classification. However, a notable example is that from 1995 to 2020, the excessive concentration of commerce in Lisbon led to severe traffic congestion and rental increases. Industrial areas often cause environmental pollution, with various gases and wastewater discharged into rivers, as well as continuous machine noise. At the same time, industrial areas can face obsolescence if they fail to adapt to economic changes, just as Lisbon's manufacturing industry struggled to compete in the era of e-commerce. Overemphasizing commercial functions can also marginalize housing demand, which is a problem observed in Manchester, where imbalanced zoning has led to considerable criminal activity.

Urban development necessitates the coordinated integration of policies, as exemplified by the harmonious expansion of Guangzhou Metro and the development of commercial hubs. Urban planners must address significant issues such as the reshaping of retail spaces by e-commerce and the demand for climate-driven green infrastructure. A sustainable urban future depends not only on data or regulations, but also on prioritizing human well-being amidst evolving socio-economic conditions and environmental safety.

2.2. Spatial Pattern of Urban Commercial Street

Urban commercial streets are important socio-economic nodes, and there are currently three main spatial types in the world: those near transportation hubs, which are mostly concentrated in a point-like manner, such as the subway retail complexes in Seoul, clustered around subway stations; those along transportation corridors, which exhibit linear development, with Oxford Street's continuous storefronts forming a stark contrast to Lisbon's scattered alleyway commerce; and another type, which is like the regional clusters found on Nanjing Road in Shanghai, typically featuring mixed-use developments [6].

The primary modes of transportation and infrastructure directly impact retail formats, but they also constrain commercial organization. Areas dominated by cars support large-scale and drive-through facilities, while pedestrian-friendly districts like Guangzhou's Shangxiajiu feature a small-scale, diverse retail ecosystem [7]. Planners in Guangzhou have successfully increased retail development through increased foot traffic by adding a bike-sharing system [8], while freight

corridors have facilitated logistics-retail collaboration [9]. Conversely, car-centric areas, especially in Los Angeles, tend to diminish street vitality. Most of them are just monotonous vehicle-filled spaces, lacking walkable paths, and naturally do not have large-scale commercial districts. Other factors include evolving consumption patterns, advancements in logistics technology [10], and historical continuity, among others—from traditional markets in Bangkok to repurposed industrial arcades in Manchester, all serve as testimonies to certain elements [11]. Each factor exerts a significant or minor influence on commercial streets; thus, they cannot be evaluated in isolation but should be considered comprehensively to achieve synergistic progress as much as possible.

2.3. Theoretical Perspectives in Urban Economics

Agglomeration economies and economies of scale are key concepts that explain why businesses tend to cluster in urban areas. When businesses attempt to share infrastructure and services to reduce costs, agglomeration effects are generated. For instance, retail stores in commercial districts such as Tianhe Road in Guangzhou benefit from centralized logistics, thereby reducing transportation costs for goods distribution. This centralization brings a virtuous cycle to commerce: more stores attract more customers, and more customers enhance business value while also reducing costs per customer. Economies of scale work similarly, where larger business clusters achieve cost savings by bulk purchasing or efficient labor allocation. A study in Lisbon showed that retail clusters with over 50 stores had 30% lower operational costs compared to isolated shops.

Commercial agglomeration enhances consumer welfare by offering diverse choices and competitive prices. When stores cluster, consumers save time visiting multiple locations, creating "one-stop shopping" convenience. In Accra's Makola Market, customers access 80% of daily necessities within a 500-meter radius, reducing travel time by 40% compared to scattered retail layouts. Price competition in dense commercial areas also benefits consumers. Data from Seoul indicates fashion stores in Myeongdong shopping districts priced items 15–20% lower than suburban outlets due to higher sales volume and reduced storage costs. Proximity logistics in mixed-use urban areas shorten delivery times for e-commerce orders, improving service quality [12]. Excessive agglomeration may create challenges like traffic congestion or rising rents. In Guangzhou's Yuexiu District, commercial street rents increased by 120% from 2010 to 2020 as clustering intensified, forcing smaller businesses to relocate. Despite this, the net welfare gain for consumers remains significant, as clustered commercial zones optimize both economic efficiency and accessibility.

3. Mechanisms of Land Use Structure's Impact on Urban Commercial Streets

3.1. The Guiding Role of Land Types

Land classification shapes commercial streets through zoning policies. Urban planning designates zones with construction constraints. In Shanghai, 78% of new cafes (2015–2019) clustered near commercial districts, reflecting format agglomeration. Residential zones foster community commerce. Beijing's Tongzhou developed 34 community commercial belts (2010–2022), 62% being laundries and bakeries. Industrial repurposing enhances value: Shenzhen's factories became galleries and cafes, demonstrating spatial adaptability. Transport networks redefine business distribution. Chengdu's Chunxi Road Metro (2016) boosted commercial density by 140%. Tourism zones like Hangzhou's West Lake generate peripheral commerce, with souvenir shops contributing 15% of municipal revenue. Building codes dictate commercial forms. Paris' Marais District height limits preserve low-rise boutiques, while Dubai's vertical zoning enables aerial malls. Retail space triples in high-density areas. Mixed-use land spawns composite formats. Tokyo's Shibuya integrates offices, housing, and commerce, attracting 89% more diverse consumers than single-use zones. Post-2010, cities like New York adopted flexible zoning for spatial hybridity. Future trends include Tokyo's 3D zoning and temporary pop-ups. Land attributes remain commercial geography's foundational syntax [13].

3.2. Agglomeration Effect of Land Space

Land space agglomeration creates economic hubs through geographic clustering, exemplified by New York's Diamond District hosting 2,600 gem businesses via self-reinforcing buyer-seller dynamics. First, transport infrastructure shapes commercial patterns: Berlin's Alexanderplatz sustains over 150 retail outlets with 300,000 daily commuters, while Tokyo's Shinjuku Station balances 3.5 million daily passengers against overcrowding risks. Second, zoning molds spatial organization: Shanghai's 5.5km Nanjing Road luxury corridor came from municipal retail policies, contrasting Bangkok's chaotic mixed-use clusters with organic street vendor competition; Barcelona's Eixample district merges grid planning and flexible commercial rules for vibrant corridors. Third, consumer behavior adapts to clustering logic: Seoul's Myeongdong meets 78% visitors' multi-store needs in compact space, and physical clusters now integrate themed cafes and experiential elements to stay relevant amid e-commerce.

The agglomeration effect influences both the economy and the environment. Economic benefits extend beyond direct commerce. Shenzhen's Huaqiangbei electronics market achieves 20% lower procurement costs through shared logistics (2019 study). Manhattan's Silicon Alley demonstrates dense office clustering drives 30-40% service-industry innovation via tech startup knowledge spillovers. The historical pattern determines the dependence of modern spatial paths. The Tornabuoni Street in Florence retains the layout of the wool guild in the luxury retail industry of the 13th century, while the maritime trade organization of the 18th century is preserved in the Boston financial district. COVID-19 has tested the group's resistance to large-scale epidemic lists. Tokyo's Ginza endured 90%-foot traffic declines during 2020 lockdowns, recovering to 85% pre-pandemic sales by late 2022 through collective marketing - outperforming dispersed commercial areas. This highlights density's dual role as crisis vulnerability and recovery accelerator through established customer networks.

3.3. Traffic Accessibility

Accessibility is crucial for the prosperity of urban commercial streets. Convenient transportation links attract customers and commuters through buses, subways, and trains. The areas along the subway lines in Tokyo and New York demonstrate how convenient transportation promotes foot traffic, enabling shops to benefit from commuters' impromptu shopping. Without such transportation connections, even well-designed streets may not be able to sustain commercial operations [14]. Location depends on integration with the transportation network. Streets near highways or main roads develop faster, serving local and regional residents. A study conducted in Los Angeles found that retail businesses located near highway exits generate 40% higher revenue, as car traffic makes people more likely to make impulse purchases. Bicycle lanes are also important: Amsterdam's bicycle infrastructure has increased the sales of cafes and small retailers through convenient access. In addition to physical connections, the availability of parking spaces is also a noteworthy factor. In cities like Houston that rely heavily on cars, shopping malls with ample parking spaces are thriving, whereas limited or expensive parking spaces can drive away many potential customers.

Transportation network is the cornerstone of commerce. It supports daily operations and serves as an important reference for business location selection. Urban planners continuously analyze transportation-related information to better determine commercial zoning. The subway expansion in Seoul in the early 21st century serves as a good illustration: stations that were previously deserted, like Digital Media City, have gradually evolved into bustling commercial centers, demonstrating that good transportation infrastructure can actively reshape retail. However, achieving transportation balance is a tricky matter - focusing too much on cars can lead to scattered development, while a poorly planned transportation system can cause considerable trouble to surrounding communities.

3.4. Land Use Structure

Land use structure fundamentally determines the interaction between business agglomeration, accessibility, and urban economic performance. Business agglomeration often stems from intentional zoning policies, as exemplified by Manhattan in New York or Shinjuku in Tokyo. These places utilize

rational land zoning policies to concentrate commercial activities, amplifying the advantages of shared infrastructure and attracting consumers. Empirical studies on planned commercial districts in Shanghai have shown that retail sales are about 15% to 20% higher compared to a dispersed layout, highlighting the role of targeted land use strategies. Accessibility directly affects mobility within commercial districts and is closely related to land use. Integrated transportation systems, such as the London Central Line connecting Oxford Street and the city center, enhance agglomeration benefits. Conversely, despite zoning interventions in Jakarta, traffic congestion has reduced passenger flow in commercial corridors, highlighting the importance of the synergistic effect between transportation and land use [15]. A reinforced cycle thus emerges: enhanced accessibility attracts commercial activities, which in turn stimulates infrastructure investment and increases economic returns. The urban economy depends on the functional balance between agglomeration and accessibility. Agglomeration promotes innovation through proximity - taking the technology hub of Silicon Valley as an example - while connectivity enables the flow of labor and consumers. In the early 21st century, after planning reforms, mixed-use areas in Berlin experienced an economic growth rate about 25% higher than that of single-function areas. However, excessive agglomeration can also bring risks: Seoul's business core area experienced rent increases and overcrowding, ultimately prompting urban planners to make policy adjustments.

From this perspective, adaptable land use frameworks possess distinct advantages as they can respond differently to varying situations, thereby fostering favorable business agglomeration and accessibility, further enhancing urban economy. Amsterdam promotes commercial centers within its bicycle network, alleviating traffic congestion; whereas Barcelona's superblock model strengthens community commerce through pedestrianization. These are examples worthy of learning, demonstrating how to adapt to local conditions. Urban planners must continually adjust land use policies in accordance with the dynamic development of the city, leveraging business agglomeration to drive sustained and resilient economic growth.

4. Conclusion

This paper demonstrates that differences in land use functions do have a significant impact on the characteristics of commercial layout. The commercial facilities around residential areas usually serve the lives of residents, while the core commercial area is a large integrated consumption venue. Although centralized land use can promote commercial clustering, it can also lead to environmental pressure and community transformation issues. In terms of transportation convenience, commercial areas around stations are often more vibrant, and a reasonable road network design can improve commercial efficiency. This paper proposes some improvement suggestions to properly solve the existing problems: adopting dynamic zoning management instead of fixed functional zoning, so that commercial layout can adapt to market changes, and can also strengthen the coordination planning between transportation construction and commercial nodes. In addition, establishing an environmental management mechanism for commercial clusters is urgently needed, such as reducing negative impacts by adding sound insulation facilities and greening. Other studies can focus on the impact of e-commerce development on the spatial distribution of physical commerce, which is a common challenge in the current digital economy era.

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