Land Use Change in Suburban Clusters and Corridors

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Diversified land use concentrations comparable with downtown in their range of functions developed in American suburbs in the last few decades. These concentrations take two forms—clusters, which usually focus on a regional shopping center or an employment center; corridors which develop along freeways. Examples of their development are presented in case studies of the Southdale Cluster and the I-494 Corridor south of Minneapolis. Four general factors affect cluster and corridor development: (a) variations in the locational tendencies of different land uses, which lead comparison goods stores and higher-value residences to locate in clusters, while automobile dealers, industrial plants, and warehouses are more likely to be in corridors; (b) characteristics of the transportation system, including metropolitan freeway configuration, local characteristics within a concentration, and proximity and access to other modes; (c) historical factors and the timing of development; and (d) other factors, including social and demographic patterns, local governmental impacts, and entrepreneurial prerogatives. Clusters and corridors developed in response to heavy reliance on automobiles and trucks. These modes will remain prominent in the foreseeable future.

Downtown will always be the historic core of the American metropolis—a zone of high-intensity land use, a setting for a diverse mix of activities, and a place of great convergence in the metropolitan transportation network. But downtown is no longer the only metropolitan locale with such characteristics. "Downtown Has Fled to the Suburbs" headlined Fortune magazine in 1972, and the last decade has reaffirmed Breckenfeld's assertion (1) that "Instead of a single nucleus, there are several: the old downtown (which has tended to evolve into an office and finance district), and a band of satellite centers on the periphery." Muller (2) has described the evolution of multifunctional concentrations of American suburbs, noting that "these major modes now confer a greater degree of spatial order on the heretofore centerless distribution of production in the suburbs".

The list of activities found in large suburban concentrations is an inventory of traditional downtown land uses—all types of retail, service, and entertainment establishments; office buildings; hotels and meeting places; governmental and institutional activities; medical facilities; industrial and wholesale operations; and higher-density residences. The only downtown activities not likely to be in suburban concentrations are low-rent transient housing and the highest-level financial exchanges. Although functionally similar to the historic downtown, the forms of these new suburban aggregations differ radically. Nonetheless, they have become major foci of activity patterns and transportation networks for large parts of the metropolis.

Like the original central business district, the new suburban "downtowns" have evolved in response to changes in the metropolitan circulation system. A number of scholars have examined facets of the development of these suburban concentrations and their relation to transportation. Geographers and other social scientists have described the changing locations of different types of land use; these studies are summarized in recent texts by Muller and Hartshorn (2,3). Attention has also focused on land uses along different types of roads. These have included analyses of land use changes along all interstate segments in Rhode Island; studies of offices and manufacturing plants along radial freeways; and a recently completed assessment of the land use and development impacts along circumferential beltways (4-7). All of these inquiries involved comparative analysis of a set of case studies, research that logically followed a diverse set of analyses of land use-transportation relations in specific locales. Finally, Schneider examined the characteristics of large suburban concentrations with special emphasis on prospects for transit development (8).

Although these studies have shed considerable light on these suburban activity concentrations, some basic questions remain unanswered. What are the basic forms and land use patterns of these new suburban downtowns? How have they developed? What factors have influenced their development? How has transportation affected their growth, and what is its role likely to be in the future? This paper will address these questions. General conclusions will be based on experiences in metropolises throughout North America, and special insights will be drawn from examination of the two largest concentrations in the Minneapolis-St. Paul metropolitan area.

CLUSTERS AND CORRIDORS

The new suburban "downtowns" take two forms—clusters and corridors. The cluster is an areal form, focusing on one or more nuclei. Large regional shopping centers are the foci of most clusters, but other activities, including airports, medical centers, and convention centers, may also attract a large number of other activities. Growth in the cluster generally proceeds outward in all directions until barriers are encountered, producing a somewhat circular form. On the other hand, corridors are linear. Activities string out along an axial freeway with most growth in the two directions along that artery, although minor spurs may also form. The corridor, therefore, takes an elongated, rectangular shape.

Distinctions between clusters and corridors are not always clear. Because many activities in clusters desire easy access from a large part of the metropolis, clusters frequently are found near freeways. Therefore, the cluster may coalesce with the corridor, producing a hybrid form that looks like a snake that has swallowed a large egg. Whether an aggregation of diverse activities in a suburban concentration is a cluster or corridor is best defined by relative location—cluster activities will refer to their location in terms of the cluster nucleus (e.g., near the XYZ Mall), while places in corridors are located relative to the freeway (e.g., along I-800).

Transportation characteristics of clusters and corridors differ substantially. Traffic in the cluster is on the existing grid of surface streets or on special routes like shopping center ring roads. There is little through traffic; most trips begin or end in the cluster. Freeways are accessed by major arterials, and street intersections in the cluster are at grade and are controlled by traffic signs or signals. In contrast, the freeways that are the backbone of the corridor carry large volumes of both local and through traffic. Grade-separated interchanges hasten flows along the freeway, but feeder streets with signal-controlled intersections often are unable to handle peak loads. The presence or absence of frontage roads has a profound impact on the accessibility of sites fronting on the freeway, and although the freeway whisks traffic along its length, it is a barrier to movement across it.
CASE STUDIES

The processes of development in suburban clusters and corridors are identifiable in two case studies, both from the Minneapolis-St. Paul metropolitan area (Figure 1). Southdale shopping center, eight miles southwest of downtown Minneapolis in Edina, is at the core of the oldest, largest, and most diversified suburban cluster in the Twin Cities area. The largest and most diverse of the Twin Cities suburban freeway corridors is along a seven-mile stretch of I-494 in the suburbs of Bloomington, Richfield, and Edina.

Evolution of Southdale Center

The Southdale Cluster evolved in three stages (Figure 2). The first stage consisted of the construction of the core shopping center in the mid-1950s. Dayton's, the Twin Cities' largest department store chain, hired Victor Gruen in 1952 to develop plans for a shopping center and associated activities on 500 acres in Edina. The site was at the edge of the rapidly advancing wave of residential expansion. One freeway was present in the area (MN-100, 1 mile to the west), and two more were planned (County Highway 62, 0.25 mile to the north, and another segment of MN-100, later completed as I-494, 1.5 miles to the south). The proposed center was to be built between the intersection of two major arterials (66th Street and France Avenue).

Gruen's design included three major changes from previous shopping center arrangements. First, the design included two stories of shops that fronted on a central mall, all of which were enclosed and climate-controlled. Second, the center was anchored by two large department stores, Dayton's and its principal competitor, Donaldson's, rather than by just one store, as had been the norm. Third, the land surrounding the center was to be sequentially developed with a set of complementary land uses. Construction of the center began in 1955, and Southdale opened in October 1956 as the nation's first enclosed shopping mall. It contained 82 stores on 750,000 ft² of retail space. A month after it opened, Frank Lloyd Wright visited Southdale and prophetically commented that the center was "just like downtown" [9].

The second stage of the Southdale Cluster evolution, roughly from 1957 to 1971, saw the center ringed with a mix of uses that quickly gave it an identity as a major diversified center. Commercial expansion to the south and east followed the guidelines of the original plan and led to construction of many free-standing establishments. Commercial diversification continued in the latter part of the stage with construction of the first secondary shopping center, with a half-dozen shops, and culminated in a major addition to Southdale in 1972. J.C. Penney anchored the new wing, which brought the total number of establishments in the center to 135 on 1.1 million ft². Medical, office, and apartment buildings also clustered around the center in the second stage. Original plans for a medical office building northwest of the center were realized in 1957, and a hospital was constructed just north of that facility in 1965. Zoning prohibited commercial activities near the hospital, so office and apartment buildings were built nearby. Throughout the 1960s, office buildings also were constructed west and southeast of the center.

The third stage of the Southdale Cluster evolution occurred in the 1970s. Major expansion to the east, north, and west was limited by single-family residences, although a mix of establishments filled in on smaller tracts in these directions. South was the only direction for significant growth, where 300 acres remained undeveloped. Seventieth Street was breached in 1973. By 1981, a flood of commercial and residential uses inundated about 50 percent of the available land. Two new shopping arcades with about 15 smaller stores were built, and one was expanded. Some new structures housed activities that had outgrown the shopping center. Residential expansion south of Southdale in the 1970s included townhouses, walk-up apartments, and high rises. Two complexes were constructed especially for elderly residents, who were attracted by the same diversity in nearby services that traditionally were available downtown. Apartment buildings continued to be built west of the offices along France Avenue, and expansion of that string of offices led to the first contact between the Southdale Cluster and the I-494 Corridor.

Evolution of I-494 Corridor

Development of the I-494 corridor has proceeded through four stages (Figure 3) [10]. First-stage development in the mid-1950s was keyed to the
rapidly expanding residential market of the southern Minneapolis suburbs. The axis of the corridor was MN-5, a two-lane rural bypass. Plans for upgrading the route to include it as part of the MN-100 beltline around the entire metropolis already had been formed, however, and the wave of residential expansion jumped over a three-block swath, leaving vacant land along most of the highway. Passage of the Federal-Aid Highway Act of 1956 changed the funding mix for the proposed freeway, but it did not affect the alignment or completion schedule for the freeway, which opened in 1960 as the Twin Cities' first Interstate segment. Nonresidential development in the initial stage was directly related to the neighboring residential boom. Building materials and equipment dealers grouped around the point where a branch rail line crossed the highway, and small neighborhood shopping centers sprouted next to the freeway.

The second stage from the 1950s into the mid-1960s saw an enormous increase in the volume of construction along the I-494 corridor. Completion of the freeway increased speeds and volumes of traffic and improved accessibility to corridor sites. One large shopping center and five smaller groups of stores were built, and six automobile dealers migrated to highly visible locations within 0.5 miles of the I-494/I-35W interchange. Industrial plants and warehouses also entered the corridor in large numbers during this stage because of improved accessibility and the availability of large tracts of land, especially at the ends of the corridor.

The third stage of development in the I-494 corridor dated from the mid-1960s into the early 1970s, when the Twin Cities' economy, like that of the nation, grew considerably. Industrial, wholesale, and commercial expansion continued as it had during the second stage. Meanwhile, tax laws prompted wealthy individuals to invest in corridor real estate development, which virtually guaranteed rapid returns. Office buildings, hotels, and apartment buildings were the most attractive investments. Offices joined industrial facilities on vacant plots at the ends of the corridor. Hotels also gravitated to the ends, especially toward the airport and stadium to the east. Apartments filled in smaller tracts in the central part of the corridor on vacant parcels.

The last decade was a period of continued infill coupled with redevelopment of some sites in the I-494 corridor. Most remaining tracts at the ends of the corridor were developed for activities comparable with those established in earlier stages. By 1981, the only large area that remained vacant was north of the freeway between Xerxes and France Avenues, where the Southdale Cluster and I-494 corridor ultimately will coalesce. The fourth stage also saw increased redevelopment as the supply of vacant land diminished and some activities ceased to be viable at their original locations. Especially notable was the abandonment of some of the original sites by construction-related industries because most residential construction in the area had ceased.

FACTORS THAT AFFECT CLUSTER AND CORRIDOR DEVELOPMENT

Although case studies of concentrations like the Southdale Cluster and the I-494 Corridor are illustrative, they do not explain why clusters and corridors develop as they do. Many factors affect land use patterns in these concentrations, including locational tendencies of specific land uses, characteristics of the transportation system, historical factors and the timing of development, and other factors.

Locational Tendencies of Different Land Uses

The overall pattern of land uses in a cluster or a corridor is the cumulative product of decisions made at particular sites. The types of locales preferred by different activities vary considerably.

Commercial establishments as a group have great geographical tolerance, and they are found in a wide range of locations. Stores that carry goods that customers will travel longer distances to purchase, often after comparing the offerings of a number of merchants, are the mainstay of cluster shopping cen-
ters. Shopping centers became a fixture in the metropolitan commercial fabric after World War II for three reasons. First, greater use of the automobile vastly increased the distances a customer was willing to travel for shopping and increased the volume of purchases one could make. Second, the growing size of the metropolis meant that stores providing high-ordered goods and services, previously restricted to downtowns, could feasibly locate in the metropolis' outer margins. Third, merchants discovered that by clustering collectively, they could offer a wider range of goods and services; by creating a larger pie, each store's share was greater than if it stood by itself.

The mixture of multiple department stores and specialty shops pioneered at Southdale has become the norm for shopping centers throughout the nation. The largest centers now have three levels, eight major stores, and 200 smaller shops. Additional commercial alternatives are available in nearby secondary centers. The attraction of shopping centers transcends their basic function as retail spaces. Large malls have become community centers for the suburbs, and center managers have booked a plethora of activities into their courtyards; they range from craft and automobile shows to symphony concerts. Child-care services, exercise programs, entertainment facilities, and cultural events attract more customers, which, in turn, attract more stores.

Not all commercial activities want or can afford cluster locations, however. Automobile dealers like to be near one another, but their space requirements force them to highly visible sites on cheaper land in corridors. Merchants offering convenience goods for local customers now occupy smaller corridor centers, as do stores offering second-hand merchandise. Such low-overhead retailers like the low rents of older corridor centers, which are still easily accessed from throughout the metropolis.

Office activities no longer must congregate downtown because frequent face-to-face contacts and direct transfers of paper have been obviated considerably by advanced communications. Easily accessed corridor locations with ample space for parking are now favored by many office users, although others prefer proximity to stores and restaurants and the prestige often associated with a cluster location. As a result, office buildings are an integral part of both clusters and corridors.

The locational criteria of hotels and motels also lead them to locate in both types of concentrations. The large, modern hostels that now dominate the suburban lodging industry increasingly provide their own meeting facilities, but spillover trade is common, which makes close proximity desirable. High visibility and easy access for passing motorists are important, too, so lodging tends to string themselves out in corridors. The traffic generated by the metropolitan airport affects location decisions. Therefore, the greatest suburban hotel-motel concentrations usually are along freeways that lead to airports.

Governmental and institutional uses vary considerably in terms of their locational preferences. Cluster locations are favored by activities that deal with the public, such as licensing bureaus, and even courtrooms are found in or near shopping centers. Support services that require more widely accessible locations, such as public works and public safety facilities, prefer sites in corridors. Corridor locations also accommodate activities that generate large traffic loads, especially sports stadiums and arenas.

Suburban medical offices and hospitals more often are found in clusters than in corridors, but they may also stand independently. When present in a cluster, medical facilities represent the desire of the developer to diversify the range of activities in the area, to attract more people to the cluster, and to increase its visibility in the metropolis. Like most other land uses, industrial and wholesaling operations have adapted their locations to changes in transportation. Earlier reliance on waterways and railroads for moving freight has been replaced by orientation to highways and freeways because trucks have become the primary mode for hauling most commodities. The desire for easy access to freeways leads many industrial plants and warehouses to locate in corridors, as does the need for large tracts of less expensive land on which to construct efficient, one-story facilities with ample space for freight transfer and employee parking. Although most suburban industrial facilities are relatively close, they still are isolated undesirable neighbors and often are zoned into a part of the corridor unwanted by other activities.

The explosive growth in demand for suburban multifamily housing since the 1960s has led to construction of many units in both clusters and corridors. More expensive apartments and condominiums are attracted to prestige locations in clusters because of the status and the proximity of stores, restaurants, and other attractions. Multifamily residential complexes often are buffers between the more frenetic activities in the cluster's core and surrounding single-family residential areas. Corridor locations are sought for lower-rent housing because units are easily accessed and are highly visible, which keeps occupancy rates higher. Buffering is important here, too, so that heavier traffic associated with apartment complexes does not pass through lower-density residential areas. Unfortunately, such buffering ensures that the maximum number of people are exposed to air pollution and noise from the freeway.

No absolutes govern the geographic behavior of specific land uses, but their locational tendencies may be arrayed on a continuum based on their preferences for locations in clusters or corridors (Figure 4). Comparison goods stores and higher-rent residences are the activities most likely to be found in clusters. In order of decreasing attraction to cluster locations are medical facilities, direct-access public services, offices, hotels and restaurants, convenience goods stores, support public services, and lower-rent residences. Automobile dealers and industrial plants and warehouses are those activities most likely to be in corridors. These locational tendencies allow formulation of composite models of cluster and corridor structure. The cluster's focus is a large regional shopping mall, surrounded by smaller shopping arcades, individual stores, office buildings, and direct-access governmental and institutional facilities. Also
medical facilities and one or two large hotels may be nearby. Higher-density housing is a buffer between the cluster and surrounding single-family residences. The corridor, on the other hand, has no buffer; it is formed by the coalescence of activities around one interchange. All commercial activities group around interchanges with roads that serve residential areas, but hotels and motels are attracted toward airports and interchanges with other freeways. Industrial and wholesale operations are the mainstay of the corridor and occupy large tracts not occupied by other land uses. Office buildings and apartments also are found throughout the corridor; these frequently fill in gaps between interchanges that are not commercially desirable.

Characteristics of Transportation System

The characteristics of the transportation system affect the forms and developments of clusters and corridors. Especially important are the configuration of the metropolitan freeway network and local characteristics within a concentration. Proximity and access to other modes may also be important.

Freeway configuration has a significant impact on the number and desirability of sites for cluster and corridor development. Because circumferential freeways offer greater access to larger parts of the metropolis than do radial freeways, clusters and corridors usually are more intensively developed along beltways. Metropolitan areas with complete freeway networks therefore tend to have a well-defined set of suburban concentrations, as do metropolises that have their freeway networks truncated by a lake or ocean or restricted by a large river. In contrast, metropolises that have incomplete freeway networks because of topographic restrictions or conscious decisions not to construct freeways offer few links or nodes for large cluster or corridor development. Development that would have taken place in these freeway-oriented concentrations instead is arrayed on major streets.

Transportation system characteristics within a cluster or corridor affect its form and development. Where frontage roads are present and have easy access from the freeway, development is extensive along the corridor. If frontage roads are absent or have restricted access, development is concentrated around interchanges. Interchange spacing is important; when interchanges are close together, such as in the 0.5- to 1-mile intervals in the I-494 Corridor, corridor development is encouraged. With wider spacing, interchange-oriented clusters rarely reach the size that permits coalescence into linear corridors. Also influential is the importance of intersecting roads. Clustering will occur around more heavily traveled interchanges when there are wide variations in traffic volumes on intersecting roads. If traffic volumes are roughly equal, however, a corridor probably will result.

Although automobiles and trucks are the primary forms of suburban conveyance, people and goods also move by air, rail, and ship. Some activities rely on more than one mode of transportation, and they are prone to locate where both modes are accessible. Industrial operations, offices, and lodgings that rely on air transportation gravitate toward airports, and so many freeway corridors are anchored by an airport. Industrial and wholesale operations dealing in large, bulky, or heavy commodities will also string out along freeways when rail or harbor facilities are available.

Historical Factors and Development Timing

To a great extent, the form and structure of a sub-
urban cluster or corridor are products of the history of the metropolis and development timing. Although freeways have become the dominant thoroughfares in most North American metropolises, older routes are more important in some areas that have markedly different structural forms. In Vancouver, for example, the absence of freeways except in two remote areas has allowed old streetcar routes to remain the highest-volume highways. Commercial strips along these streets are still an integral part of the city's retail landscape, and few significant clusters have emerged.

The timing of freeway construction relative to the development of adjacent land is also important. If adjacent land is developed before the freeway is built, little land is left for any freeway-oriented development, and only small clusters will form at major interchanges. If the freeway is built long before the adjacent land is improved, clustering at interchanges again will predominate, with development along the freeway between interchanges only an afterthought from the clusters. Ideal for corridor development are circumstances like those along I-494 south of Minneapolis, where concurrent development of the freeway and of nearby land left a narrow band of available sites, which were rapidly improved.

Present land use patterns also reflect the norms of the period when development took place. Clusters and corridors that emerged in the two decades after World War II were extensions of independent activities and evolved with little comprehensive planning. More recently, longer projects planned by single developers with active local governmental involvement have produced more cohesive mixtures—especially notable in showcase clusters like Newport Center, which is southeast of Los Angeles.

Other Factors

A final set of factors that influence cluster and corridor development includes social and demographic patterns in the metropolis, actions of local governments, and entrepreneurial prerogative. Social and demographic patterns are manifest in metropolitan patterns of prestige and disposable income. In most metropolises, the oldest and largest cluster is in the highest-income suburban sector. Given a certain number of customers who will visit shopping centers in a cluster, merchants would prefer them to be wealthy; more cash in pocketbooks usually translates into more cash in the till. Shopping centers that cater to wealthier persons also attract less prosperous customers; the converse is not true.

Local governments have a variable impact on the timing and rate of development. As noted by Schneider (9), Canadian cities generally have more extensive development controls than municipalities in the United States. As a result, high-intensity activity is more concentrated within Canadian central cities, and suburban clusters and corridors are less developed. Within the United States, opportunities for public control have been more limited. The similarity of suburban development forms in metropolises like Houston, which is famed for the absence of zoning, and the Twin Cities, which has an active and powerful metropolitan government, indicates that what controls are exercised have relatively little impact on cluster and corridor development.

A final explanation for cluster and corridor development might be called entrepreneurial prerogative. Land use patterns ultimately result from the decisions of many individuals, and some people will not do what is expected. For example, based on the relative preferences for various locations by different land uses, an office building should not face
Any examination of suburban clusters and corridors invariably emphasizes the importance of transportation. These concentrations evolved in a period when the automobile was the primary mode of intraurban passenger travel and the truck was the most common way to move freight. Their land use patterns, scales, shapes, and identities resulted from heavy reliance on these modes. No other forms of transportation serve as well for most trips in these concentrations, and none will do so in the foreseeable future. Experience in the last decade, when Americans turned to more fuel-efficient vehicles and adjusted their tripmaking behavior to conserve fuel, showed that a transportation system dependent on automobiles and trucks is extremely flexible. Continued increases in gasoline prices likely will reinforce the locational advantages of suburban clusters and corridors because these concentrations offer the greatest range of destinations, thereby facilitating multipurpose tripmaking.

Limits are being reached in the local transportation systems of clusters and corridors, however. Traffic volumes are very high. In the Southdale and I-494 areas, for example, major surface streets now carry more than 20,000 vehicles daily, and freeways carry from 50,000 to 90,000 vehicles (11). The three highways that serve mammoth Woodfield Mall northwest of Chicago collectively carry more than 156,000 vehicles/day (12). Congestion is common during morning and evening rush hours in large clusters and corridors, and it also occurs at midday because many workers must drive to restaurants for lunch. Traffic control improvements have been implemented to make cluster and corridor traffic flows more efficient. Little more can be done to improve movement in most established concentrations. If congestion continues to impede traffic, activities will redistribute themselves in smaller clusters or at accessible points on the freeway network, thereby adding to the forces of corridor development.

Ridesharing programs in suburban clusters and corridors have not been as successful as planners had hoped, largely because dispersed locations and divergent working hours have made trip scheduling difficult. With up to 100,000 employees in the largest concentrations, however, the potential for ridesharing remains great—especially as flexible work scheduling is more widely accepted by employers. The increasing use of shuttle vans and other forms of paratransit in clusters and corridors will continue for elderly residents who do not have automobiles.

Regular-route transit's future in suburban clusters and corridors is problematical. The dispersal of activities in these concentrations makes effective bus or fixed-gui1deway service difficult. In addition to uncertainty about what system designs, if any, might efficiently serve clusters and corridors, grave doubts exist regarding funding for construction and operation of new transit systems.