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Economic and Travel Impacts of Bypass Roads:
A Comparative Study of Israel and the U.S

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Abstract:

In this study we are documenting and comparing the economic and travel impacts of bypass roads in the United States and Israel on the towns near which they are constructed. Using historical research, on-site observations, interviews, surveys, and data analyses we consider the effects of bypasses on local and through traffic, travel patterns, development patterns, and the local urban economy in the immediately affected communities. We aim elucidate how road design, market forces, local politics, land use policies, planning and zoning and location-specific factors interact to produce the effects we observe. The incidence of costs and benefits upon various interest groups within the local community is a particular focus of the research.

In Israel, we are examining the impacts of a regional road affecting three towns. In the United States, we are examining the impact of two different regional roads, one in New Hampshire and the other in California, each road affecting two towns. For all the cases, the bypasses divert traffic from the centers of small communities that are along major corridors for through traffic. The bypasses have been built at different times and some towns have not been bypassed, allowing us to consider with/without effects as well as the effects of the bypasses over time. We will consider not only overall impacts of the roads but the spatial and socio-economic distribution of those impacts.

1. Introduction

Bypass roads are special roads or highways constructed for the purpose of deflecting traffic from certain areas, often from the centers of cities and towns. The principal reasons for their construction are the removal of through-traffic from the center of a town or city to the periphery, for purposes of improving the flow of traffic, shortening travel times, and reducing traffic accidents. However, bypass roads also have environmental and economic consequences. On the one hand, they reduce noise and pollution emissions along the previous route. The lower level of traffic can improve the local qualities of the bypassed area, such as its pedestrian comfort, and make it possible to install amenities that can enhance local economic development (e.g., widened sidewalks, street trees, a local shuttle, etc.) On the other hand, bypass projects often raise severe fears among local proprietors and businesses along the bypassed route, who worry that their business revenues and the value of their properties will decline with the reduction of passing traffic. Depending on the land use controls in place in the vicinity of the bypass, downtown merchants and others also may worry that the bypass will shift commercial interest and activity to the town edges and off-ramps of the bypass, resulting in sprawl development and its related auto dependencies.

Previous studies of bypass roads in the United States have focused primarily on traffic shifts and to a lesser extent on changes in the amount and type of local economic activity. We are unable to find more than a handful of studies that have looked more broadly at the larger political, social, and regional economic context in which bypass decisions are made and in which the bypasses' local impacts are embedded. It is precisely this broader perspective that we take in this study: to document not only the localized traffic and economic impacts of the bypass road, but also to look at how the decision-making process, local planning and community action, and the regional economy affect the outcomes of the bypass.

To examine this broad range of issues, we have chosen to apply mixed methods in the context of case studies. We use historical research, on-site observations, interviews, population and economic data analysis, surveys, and traffic analysis to evaluate the impacts of the bypass roads in two countries – Israel and the US - and in two US states. Our focus is not on regional impacts (the subject of much of the previous work on bypasses) but rather on the local effects of bypasses - the traffic changes they produce and the related changes that occur in local urban development and its spatial patterns, on housing location and commute patterns, and on shopping patterns in the immediately affected communities. We also evaluate changes in safety, environmental quality, resident satisfaction, and related quality of life concerns, and we will elucidate how market forces, local politics, planning and zoning, and location-specific factors interact to produce the results we observe.

Comparing Israeli and US experience with regard to bypass roads interests us and is of value to planners and urban researchers because of the many differences in the two countries in terms of zoning and land use regulation. The effects of bypass roads are intimately interconnected with zoning and land use planning. Comparing experiences in the two countries allow us to see how

different land use policies shape the transportation-land use interconnections. Further, by considering two US states with their own different sets of requirements for land use planning, we will be able to better examine the effects of context and government regulations and practices.

In Israel, we examine a regional road affecting three towns. In the United States, we examine two different regional roads, one in California and the other New Hampshire, each road affecting two towns. For all the cases, the bypasses divert traffic from the centers of small communities that are along major corridors for through traffic due to tourism, interregional travel, and shipping. The bypasses have been built at different times and some towns have not been bypassed, allowing us to consider with/without effects as well as the effects of the bypasses over time

2. Previous Research on the Topic

Public investment in road infrastructure is generally regarded by policy makers as a tool for enhancing both mobility and development at the regional or local level. Governmental policy has often favored transfer of public resources to investment in highways as an instrument for promoting metropolitan or rural economic development. Periodically, concerns have surfaced that just such effects would occur in the “wrong” locations, i.e., that such investments will cause or contribute to sprawl and related environmental damage. (Real Estate Research Corporation TCRP Costs of Sprawl Revisited) Classical theories dealing with location decisions of households, industries, employment and service centers, are in large part built upon the role of the transportation in siting, location choice, and land use distribution of activities (Weber 1928, Alonso 1964, Christaller 1966, Mills and Hamilton 1989). Transportation determines accessibility to various locations, expressed particularly in transportation costs and travel times. These theories predict that transportation system improvements should alter land rent gradients and urban pricing and density patterns (Alcaly 1976, Mohring 1993).

A special case worth noting is when a new highway is also a road that bypasses an existing town. In theory, access roads, bypass roads, and highways are thought to promote economic development both because they improve accessibility and because they lure business activity into the locality, especially businesses dependent on traffic (gasoline stations, restaurants, hotels, etc.) which can benefit from site-specific accessibility increases. Indirectly these activities have other spillover effects, such as increasing local tax revenues and perhaps local job creation.

At the same time, it is conceivable that bypass roads have injurious impacts on localities, because they allow the displacement of economic activities, which may relocate at the periphery or outside the locality. For example, increased accessibility at bypass connectors or ramps may attract big box retail uses that out-compete downtown merchants. The net result may be negative for the affected town (though it may at the same time be positive for consumers) and also may be negative overall, considering externalities (such as increased emissions and energy use due to longer trip lengths.) Alternatively, reduced travel times due to a bypass may increase the shopping destinations that area residents can reach in a reasonable amount of time, reducing the relative attractiveness of local shops.

Many papers have tested the impact of road construction upon urban and economic development, and in particular whether the expected benefits from the construction are empirically evident. Most of these papers address the effects of highway or major inter-regional and regional road construction, and the regional connection between transportation and land uses (Boarnet 1998, Boarnet and Haugwout 2000, Giuliano 1989, 1995, Forkenbrock and Foster 1990, 1996, Isserman and Rephann 1994, Moon 1989, Stephanedes and Eagle 1987, Hansen, Gillen, and Puvathingal, 1997, and others).

The conclusions from this literature are mixed and ambiguous. Some research indicates that net increases in urban development and economic activity result from the road construction. (Hansen, Gillen and Puvathingal, 1997). Other studies have found that new highways have only a small, and often negligible, impact on land prices and land use patterns, with effects concentrated in the proximity of the road, especially in areas where a developed road network and infrastructure already exist (Giuliano 1985). Yet other studies have found displacement of economic activity from one location to another as a result of the road construction, where the total volume of net economic activity remains more or less unchanged. (Boarnet 1995.)

Looking more specifically at the effects on local communities, it is not clear from the literature whether the net impact on local communities is most likely to be beneficial or harmful. Most studies are based on specific cases; some papers conclude that the roads make a positive contribution to the local economies (Buffington and Burke 1991, Burress 1996, Harris 1973, Stephanedes and Eagle 1982), but others found harmful, even destructive, effects of the roads, especially upon small towns (Mackie 1983, Edwards 1991).

Part of the reason for the inconclusiveness of these studies is that their results depend on the context in which the cases examined are situated. A limitation in much of the literature is a lack of documentation, much less analysis, of the development conditions and political and policy context in which economic changes are framed. Yet, combing through these studies, we can identify a number of factors that help to determine the effects of bypass roads:

- The size and scale of the facility and the benefits, in reduced travel time and travel cost, that it confers in comparison to the bypassed route
- The level of economic development of the locality and of the surroundings, an important determinant of overall travel levels (Hart 1993, Hale and Walters 1974)
- The level of development of road infrastructure in the area, in particular the number of alternative routes - itself closely correlated with general economic development (Moore and Thorsnes 1994).
- The population size of the locality (Blonk 1979), which in part determines the level of use of the facility; growth rates over time
- Proximity of the locality to other cities and towns, including employment centers, also affecting levels of use (Mohring and Horwitz 1993).
- The distance of the bypass segment from the locality (Buffington and Burke 1991, Plotas 1997) and hence its localized effects on travel route choice, access to different districts within the locality, etc.

- The economic, social and managerial infrastructure and structure of localities served by the bypass, including road operations and management policies as well as economic development policies
- Local planning policy, including land use assignments, particularly in the proximity to the bypass road's route (Hall 1982).
- The ethnic and political structure of local communities, including the differential allotment of fiscal resources and other public resources within and among localities
- The degree of community control over infrastructure and land use decisions.

We also note that in the literature, economic development has been defined in many different ways. Because different researchers adopt different criteria, measures, and definitions, it is often difficult to draw conclusions from comparisons across research projects. (Andersen et al 1993, Buffington and Burke 1991, Edwards 1991, Plotas and Benekohal 1997, Payne-Maxie 1980, Snyder and Associates 1999, Thompson et al 2001, Wesibrod 2001). Among the indicators that have been used by previous researchers are the following: population growth, employment growth, income/wage levels, retail sales volume, traffic volume and safety, manufacturing labor force size, number of local employers, land use distribution patterns, land and property prices, industrial and commercial space, housing space and prices, tourism volume, commerce profits, spatial distribution of businesses, and travel patterns. Most studies, however, use only a few of these indicators.

In general, these indicators address changes in totals, classes or types, prices and spatial distributions of these variables. Yet there also is the issue of "social equity" of road construction, by which is meant the differential impact on different ethnic, socioeconomic or demographic groups, especially minority and low-income populations. Are the poor adversely affected by the road? Does the road harm those in rural areas relative to urban? Only a few papers have addressed this topic; those that do so include De Silva, Peters and Bailey (1993) and Lane, Hoffeld and Griffin (1998).

In addition, as Bartholomew (1995) and Edwards (1991) have previously noted, there has been relatively sparse attention in earlier research to the issue of the role of land use planning and policy on the nature of the impacts of road construction and bypass roads.

In sum, previous studies on bypass roads have focused on overall economic impacts and have given far less attention to the context in which those impacts come into being. The studies have identified many contextual factors that are important determinants of outcome, but few studies have systematically examined the full set of factors. And while distribution of effects and the role of land policies have both been identified as important issues, both topics are currently under-studied.

3. Research Questions

Our aim is to analyze and document the impacts of bypass roads on local conditions, and will extend from traffic conditions and safety to changes in location, development, and the local urban economy. The incidence of costs and benefits upon various interest groups within the local community and other related communities are a particular focus of the research. Both in previous research and in practice, economists and planners evaluating construction of these sorts of roads have tended to use cost-benefit analysis and concentrate on the bypass road's savings in time (for commuters and other travelers) and reductions in accidents. However, the full set of effects of interest from a policy perspective also includes the differential travel time changes for different road users (e.g., bypass users, local road users) as well as the different levels of accessibility conferred on land parcels served by the bypass and those served by the bypassed road (e.g., accessibility to sites along the bypass connectors or ramps vs. downtown access). From a local perspective, these differentials are often more important than the net impact calculations of the benefit-cost analysis, and our work aims to specifically address this policy concern.

To fully understand the impacts of the bypasses we have selected for study, we investigate the following questions:

- What was the history of the bypass: the motivations for building it, its supporters and opponents, the arguments made for and against its construction, the discussion in town meetings and news reports? What was the understanding of the bypass's impacts as presented in public documents and the press? How did the politics of the bypass and related planning efforts affect the location and design of the bypass?
- During the construction process and once the bypass was built, what were the short term effects (economic, social, spatial, political) of the bypass road in these towns? Were changes made in anticipation of the bypass?
- What longer-term effects have surfaced and how have the effects varied by location, business type, and travel category?
- How did land use planning affect the nature of these impacts?
- What other factors explain differences in impacts between and within the cases?
- What other factors explain differences observed in the experiences with bypasses in the two countries?

We intend the research results to add to scholars' and public policymakers' understanding of a widely debated public policy issue, shedding light on the ways that various interest groups are affected and influence road planning projects.

4. Methodology

Impact studies of roads, including bypass roads, involve three main methodological problems, as the review of the literature has noted. First, it is necessary to identify the physical spatial boundaries for the area to be analyzed. Second, it is necessary to define urban and economic development and identify which indicators or parameters meaningfully measure these. Third, there is a need to design the research in order to isolate the effect of the road upon development, distinct from other factors that also affect it, e.g., population growth trends unrelated to the road construction, local economic climate, local tax policy, other infrastructure investments, etc.

Because we are particularly interested in local impacts and the effects of locally controlled decisions such as land use and zoning, we have adopted the specific formal township boundaries in considering spatial location impacts. However we consider all travel since that also affects the local community whether a specific trip is wholly contained there, has a start or end there, or is simply passing through.

Because we are interested in the interactions of political and economic factors producing the effects of bypasses, we examine the full range of urban and economic development indicators identified in previous research, including local and areawide changes in population and employment, changes in local political perspectives about development and transportation, changes in land use policies and regulations and in actual land use and location, and changes in travel patterns and volumes, crash rates, and the like.

Impact studies of road construction generally use either cross-sectional or longitudinal study methods, where cross-sectional methods assess the impact of roads by comparing "with/without", that is, areas in which a new road was constructed, compared with one in which none was constructed. Longitudinal studies analyze a given area over time, comparing the situation before construction with that thereafter ("before/after"). In neither methodology is it fully possible to overcome problems of isolation of the effects of the road from other changes and influences in the area of the construction or over time. Here we combine the two methods, using a mixture of cross-section and longitudinal analysis to the extent that data are available. In the last phase of the project we also will attempt to compare objective data about traffic levels, economic development, etc. with subjective data from questionnaires in which we ask for resident and business owner/manager impressions and opinions about the same issues.

The cross-sectional analysis involves comparison of towns as well as comparison of two US states and two countries. The longitudinal aspect is that all towns are examined over a time period of about fifty years, but focusing on sub-periods before bypass planning was announced, during the "anticipation period", in which intentions to construct the new road were known to the public but the road was not yet built, and after construction.

For purposes of assessing the impacts, we consider localized effects in different subareas, i.e.:

- Areas located alongside the internal "old" road passing through the center of the town.
- Areas located alongside the bypass road.
- Areas located in between A and B.
- All other areas in the town.

Part of our analysis is quantitative. We document and statistically analyze changes in total population, average household income, poverty rate, unemployment rate, commute patterns, number of housing units, median home value, number and type of commercial enterprises, size of commercial enterprises, total employment and employment type, etc. We also document and analyze changes in traffic levels and traffic composition, the incidence and severity of traffic accidents, property values, numbers and spatial distribution of housing, numbers and spatial distribution of businesses of various types, and other changes in land use. As part of the land use analysis we are documenting land use laws, zoning, and related regulations that may have an impact on growth patterns.

In addition to the quantitative description, we also review public documents, news reports and other source materials and conduct surveys and interviews with different stakeholders—residents, business owners, and government officials. These investigations are intended to help us understand the aims and purposes of the bypass road in the understanding of the various stakeholders and to assess whether the projects are seen as successful or less. We are particularly interested in whether there have been unanticipated / unintended consequences.

5. The Cases

Israel

One of the most interesting Israeli experiences with a bypass road involves the opening of Regional Road 85 in the Northern part of Israel (Western Galilee). This is part of the main road that runs from the coastal town of Acre to Safed in the high mountains, running roughly west-east (See Figure 1). This main road runs past or through a number of towns and villages, including several predominantly-Arab towns. In some cases the road was constructed around the periphery of the towns and in other cases it is built through the centers of the towns.

We analyze the impact of Regional Road 85 (the Acre-Safed road) in three towns, each with a population of about 12,000: Majd al-Krum, Rama, and Nahaf. These three towns were selected for several reasons. For Majd al-Krum, bypass segments were constructed twice (in 195 and 1996) in order to divert traffic from inside the town. Rama has one bypass. In Nahaf no bypass segment has been constructed. All three are Arab towns, and all are at roughly the same size and socioeconomic levels. The principal reason for creating the bypass segments was to remove the traffic from passing through the town in order to cut down the number of road accidents and improve safety.

US

For the US we examine the cases of two New Hampshire towns, Henniker and Hillsborough, where State Route 9/202 bypasses were built several decades apart, in part to reduce congestion due to summer and winter tourist traffic and in part to facilitate East-West trucking between the Maine and New Hampshire coastal cities and state capital and Vermont, Albany, NY and points farther west. In a later phase of the project we also will examine two California towns, Modesto and Merced, along State Route 99. In both towns, bypasses were proposed as conveniences for

tourists heading to the Sierra Nevada and Yosemite and as truck routes for agricultural freight movements from the Central Valley to the San Francisco Bay Area and Pacific ports. Modesto accepted the bypass; Merced refused it.

In the New Hampshire case, we are able to view the effects of bypasses built at different times and in towns with different land use agendas. The bypass roads in New Hampshire began to be discussed as early as the 1950s but were controversial and did not get built immediately. Henniker acceded to the bypass more than thirty years ago but required a connection to be built linking the bypass to the heart of its downtown, so that traffic can easily reach the businesses there. By the same token, the bypass has greatly speeded up access to Hillsborough (seven miles west) and Concord (ten miles east), both with larger and more diverse shopping opportunities.

Hillsborough rejected the bypass until about a decade ago, when a change in business leadership and in perspectives on the effects of downtown traffic congestion (initially seen as business-generating, later seen as stifling) led to a change in position. The bypass was approved, but a direct connection to Main Street was banned because it would have put traffic through a residential area and past the school complex. Since the bypass opening, a major effort promoting Main Street revitalization downtown has been undertaken, but at the same time considerable development has occurred along a major interchange at the edge of town, where big-box development proposals have generated considerable controversy. The most recent of these has been a proposal to build a WalMart superstore. The effects of the development shifts and the debates are larger than the town itself because the town serves as an employment and market center for a dozen other towns in the area, but decision-making rests with Hillsborough officials.

In the California cases, we will be able to analyze the effects of bypasses in two larger towns undergoing transformations in response to fast population growth, a result of annexation of settlements in formerly unincorporated areas, changes in agricultural production (toward crops requiring year-round labor, hence permanent residents), high birth rates among recent immigrant populations, and other economic and social phenomena. Since the bypass was welcomed in one town (Modesto) and opposed in the other (Merced), with the latter community focusing on downtown revitalization and capture of tourist trade, the cases will allow us to examine the political dimensions of transportation decision-making as well as the economic consequences of the decisions. In each town the pattern of growth with and without the bypass is a key issue, as is the importance of through traffic vs. local traffic to economic activity.

6. Some Preliminary Findings

Note to reviewers: because of delays in funding we are still in the throes of research.

Israel

A first case study has been begun on one of the towns in Israel (Majd al-Krum), through which a bypass road was constructed. There, the alterations in the routing of the road have significantly affected the town in all areas examined: the number and severity of accidents, their spatial distribution within the town boundaries, and land prices in different neighborhoods within the town. Different subareas within the town were affected differently by the bypass road and in some cases in contradictory directions (e.g., road accidents and land prices). These differences have raised equity issues which in turn have become political issues. The differential distributional effects are related to a number of factors but the most important are the specific location of the road and its distance from the town center, and local zoning plans and rules affecting where development could occur.

We found that the bypass has had a strongly positive effect upon the development of local businesses and commercial activities alongside the previous traffic artery, where local planning policy was in place to permit such activity to bloom once traffic levels were less problematic. However, traffic accidents within the town increased following the construction of the bypass. This last finding contradicts much of the previous research on the effects of bypass roads. From preliminary examination, it appears that the higher levels of activity have increased pedestrian and motor vehicle conflicts.

US

In the New Hampshire case, the network topography and location of connections from the town center to the bypass road are having major impacts on land development, with significant differences between the two centers.

Henniker's one connection leading to the town center has helped to the small downtown grow. The bypass removed several thousand cars a day at the time it was built; backups are now a thing of the past. Further, the bypass allowed the town's main street to avoid through traffic levels that have quintupled over the years since bypass construction, while maintaining easy access from the town center to the bypass via a scenic street of pleasant homes and churches.

The town has allowed a few businesses to locate near the freeway – an Agway farm and garden store, a sit-down restaurant, a pharmacy, a supermarket. Other businesses have located along the old road and on a few side streets. They include not only the handful of small businesses that predate the bypass, which have survived massive changes in retailing, but also several restaurants, a small grocery, cafes, bakeries, and three bed and breakfasts

New England College, a private liberal arts college with about 4000 undergraduate and masters students, has more than doubled in size since the bypass was put in. College officials believe that this much growth would have been infeasible without the bypass; it reduced travel times to Boston by about 25 minutes and also made the town far more scenic, a major attraction for many of its students. In addition, since the bypass, the number of businesses in town have more than doubled.

Hillsborough's bypass is newer, having been installed only three years ago after years of resistance and indecision. Connections to the bypass were made at either end of town, about four miles apart; no direct connection was made to the main shopping street because the traffic would have been routed past the school, library, town hall, and medical buildings.

Changes resulting from the bypass have been complex. Downtown merchants, most of whom supported the bypass believing that traffic relief would help their businesses, have had mixed reactions since the bypass opened. Some believe the downtown is more pleasant and comfortable with less through traffic, and that tourists are more willing to linger, walking around to see what else is available.

During the period that Main Street was a major carrier of through traffic, street trees were lost to Dutch elm disease and the highway department used the then-vacant planting strip for lane widening. Now that traffic has declined and traffic backups have disappeared, merchants have successfully organized a Main Street improvement program that has rebuilt a small downtown park, converted an old car parts store to a town museum, convinced the Post Office to stay downtown. Two new restaurants are doing a booming business and a new café, a tavern, a candy store, and a bakery have opened in retail space formerly used for "antiques". Another space, long vacant, is in the process of being renovated. New brick sidewalks are under discussion. All these changes are widely viewed by both residents and merchants as big improvements. Residents also are investing in downtown; nearby homes dating from the 1700s and 1800s are being restored and two old mills have been converted into apartments with a river view.

However, some merchants are not so pleased with the changes. Now that they see the bypass in operation, they realize that it has created two major points of enhanced accessibility, both away from downtown; these newly accessible locations are now bringing new businesses to town that compete with the old-timers.

In anticipation of the bypass, a large lumber store and hardware complex was sold to a major supermarket chain, which razed the buildings and put in a large new market and pharmacy. Within months after the new supermarket went in, the small market at the edge of the downtown closed its doors. The loss of about 30% of its business to the bigger store was too much for the downtown store to withstand. A second locally owned supermarket has since closed, leaving the town with only one (albeit largish) grocery. While some supporters of the new supermarket had opined that it would offer lower prices than the local stores and draw from a larger market, possibly leading new shoppers to visit other local stores, the evidence to date is not particularly supportive: prices are no lower and, while there are indeed more shoppers from nearby towns, almost none go on to other stores or businesses in Hillsborough after grocery shopping.

Recently, the town was rocked by a proposal from WalMart to build a super-center near the new supermarket, on land that for many years has been zoned highway commercial. The proposal has both supporters and detractors. The last of the town's clothing stores closed in the 1990s, a few years before the bypass opened; only one store still sells appliances. Some townspeople think WalMart will bring them convenient access to a wider variety of goods, at better prices than the locals can offer. Others decry WalMart as offering goods at prices that will put their competitors out of business. Town officials worry that WalMart will attract so much traffic that the benefits of the bypass will be lost at that end of town. The town is moving cautiously to consider Walmart's application and it remains to be seen what decision will be made.

The town is also finding, to their surprise, that Hillsborough has become a target for new housing development at the edge of town, now that Concord (the state capital) can be reached in 20 minutes and the southern NH high-tech belt is a 40-50 min. commute. Because NH pays for schools using local property taxes, the housing boomlet has put considerable pressure on school budgets. As a result, a housing cap is now being debated.

7. Conclusions

In this paper we have reported only the first stages of our work. Nevertheless, we can reach some tentative conclusions:

- Towns often opt for bypasses when heavy traffic makes them places to avoid or places that are unsafe. Bypasses do seem to reduce through traffic and help make places more attractive to investors and customers. In one Israeli case however traffic safety worsened after the bypass reduced traffic.
- Reduced through traffic has made bypassed towns more attractive, which in turn has led to new investment in existing businesses and residents as well as new development.
- Greater accessibility to the region, as measured by better travel times from nearby job centers, also supports growth. In many cases this growth effect was unanticipated by local officials.
- When bypass connections offer direct access to downtown, downtown is strengthened by the combination of improved accessibility and improved local traffic conditions. However, when bypass connections are to the town's periphery, the new accessibility thus provided can help spawn new commercial centers there that may compete with downtown merchants and reduce their market share – a fact that was not fully appreciated in advance by local officials and merchants.

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