Chapter 3  Learning from Experience

Section 1  A Success Story of Urban Planning: Curitiba*

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As late as the end of the nineteenth century, even a visionary like Jules Verne could not imagine a city with more than a million inhabitants. Yet, by the year 2010 more than 500 such concentrations will dot the globe, 26 of them with more than 10 million people. Indeed, for the first time in history more people now live in cities than in rural areas.

Most modern cities have developed to meet the demands of the automobile. Private transport has affected the physical layout of cities, the location of housing, commerce, and industries, and the patterns of human interaction. Urban planners design around highways, parking structures and rush-hour traffic patterns. And urban engineers attempt to control nature within the confines of the city limits, often at the expense of environmental concerns. Cities traditionally deploy technological solutions to solve a variety of challenges, such as drainage or pollution.

Curitiba, the capital of Paraná state in southeastern Brazil, has taken a different path. One of the fastest-growing cities in a nation of urban booms, its metropolitan area mushroomed from 300,000 citizens in 1950 to 2.1 million in 1990. Curitiba’s economic base has changed radically during this period: once a center for processing agricultural products, it has become an industrial and commercial powerhouse. The consequences of such rapid change are familiar to students of Third World development: unemployment, squatter settlements, congestion, and environmental decay. But Curitiba did not end up like many of its sister cities. Instead, although its poverty and income profile is typical of the region, it has significantly less pollution, a slightly lower crime rate and a higher educational level among its among its citizens.

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Designing with Nature

Why did Curitiba succeed where others have faltered? Progressive city administrations turned Curitiba into a living laboratory for a style of urban development based on a preference for public transportation over the private automobile, working with the environment instead of against it, appropriate rather than high-technology solutions, and innovation with citizen participation in place of master planning. This philosophy was gradually institutionalized during the late 1960s and officially adopted in 1971 by a visionary mayor, Jaime Lerner, who was also an architect and planner. The past 25 years have shown that it was the right choice, Rafael Greca, the current mayor, has continued the policies of past administrations and built on them.

One of Curitiba's first successes was in controlling the persistent flooding that plagued the city center during the 1950s and early 1960s. Construction of houses and other structures along the banks of streams and rivers had exacerbated the problem. Civil engineers have covered many streams, converting them into underground canals that made drainage even more difficult—additional drainage canals had to be excavated at enormous cost. At the same time, developers were building new neighborhoods and industrial districts on the periphery of the city without proper attention to drainage.

Beginning in 1966, the city set aside strips of land for drainage and put certain low-lying areas off-limits for building. In 1975, stringent legislation was enacted to protect the remaining natural drainage system. To make use of these areas, Curitiba turned many riverbanks into parks, building artificial lakes to contain floodwaters. The parks have been extensively planted with trees, and disused factories and other streamside buildings have been recycled into sports and leisure facilities. Buses and bicycle paths integrate the parks with the city's transportation system.

This "design with nature" strategy has solved several problems at the same time. It has made the costly flooding a thing of the past even while it allowed the city to forgo substantial new investments in flood control. Perhaps even more important, the use of otherwise treacherous floodplains for parkland has enabled Curitiba to increase the amount of green space per capita from half a square meter in 1970 to 30 today—during a period of rapid population growth.

Priority to Public Transportation

Perhaps the most obvious sign that Curitiba differs from other cities is the absence of a gridlocked center fed by overcrowded highways. Most cities grow in a concentric fashion, annexing new districts around the outside while progressively increasing the density of the commercial and business districts at their core. Congestion is inevitable, especially if most commuters travel from the periphery to the center in private automobiles. During the 1970s, Curitiba authorities instead emphasized growth along prescribed structural axes, allowing the city to spread out while developing mass transit that kept shops, workplaces, and homes readily accessible to one another. Curitiba's road network and public transportation system are probably the most influential elements accounting for the shape of the city.

Each of the five main axes along which the city has grown consists of three parallel roadways. The central road contains two express bus lanes flanked by local roads, one block away to either side run high-capacity one-way streets heading into and out of the central city. Land-use legislation has encouraged high-density occupation, together with services and commerce, in the areas adjacent to each axis.

The city augmented these spatial changes with a bus-based public transportation system designed for convenience and speed. Interdistrict and feeder bus routes complement the express bus lanes along the structural axes. Large bus terminals at the far ends of the five express bus lanes permit transfers from one route to another, as do medium-size terminals located approximately every two kilometers along the express routes. A single fare allows passengers to transfer from the express routes to interdistrict and local buses.

The details of the system are designed for speed and simplicity just as much as the overall architecture. Special raised tube bus stops, where passengers pay their fares in advance (as in a subway station), speed boarding, as do the two extra wide doors on each bus. This combination has cut total travel time by a third. Curitiba also runs double- and triple-length articulated buses that increase the capacity of the express bus lanes.

Ironically, the reasoning behind the choice of transportation technology was not only efficiency but also simple economics: to build a subway system would have cost roughly US $60 million to US $70 million per kilometer; the express bus highways came in at US $200,000 per kilometer, including the boarding tubes. Bus operation and maintenance were also familiar tasks that the private sector could carry out. Private companies, following guidance and parameters established by the city administration, are responsible for all mass transit in Curitiba. Bus companies are paid by the number of kilometers that they operate rather than by the number of passengers they transport, allowing a balanced distribution of bus routes and eliminating destructive competition.

As a result, average low-income residents of Curitiba spend only about 10 percent of their income on transport, which is relatively low for Brazil. Although the city has more than 500,000 private cars (more cars per capita than any Brazilian city except the capital, Brasília), three quarters of all commuters—more than 1.3 million passengers a day—
take the bus. Per capita fuel consumption is 25 percent lower than in comparable Brazilian cities, and Curitiba has one of the lowest rates of ambient air pollution in the country.

Although the buses run on diesel fuel, the number of car trips they eliminate more than makes up for their emissions.

In addition to these benefits, the city has a self-financing public transportation system and avoided being saddled by debt by paying for the construction and operating subsidies that a subway system entails. The savings have been invested in other areas. Even old buses are used to provide transportation to parks or serve as mobile schools.

The implementation of the public transport system also allowed the development of a low-income housing program that provided some 40,000 new dwellings. Before implementing the public transportation system, the city purchased and set aside land for low-income housing near the Curitiba Industrial City, a manufacturing district founded in 1972, located approximately eight kilometers west of the city center. Because the value of land is largely determined by its proximity to transportation and other facilities, these "land stocks" made it possible for the poor to have homes with ready access to jobs in an area where housing prices would otherwise have been unaffordable. The Curitiba Industrial City now supports 415 companies that directly and indirectly generate one-fifth of all jobs in the city; polluting industries are not allowed.

**An Integrated Busways Design: Participation Through Incentives**

Curitiba’s express bus system is designed as a single entity, rather than as disparate components of buses, stops, and roads. As a result, the busways borrow many features from the subway system that the city might otherwise have built, had it a few billion dollars to spare. Most urban bus systems require passengers to pay as they board, slowing loading. Curitiba’s raised tube bus stops eliminate this step; passengers pay as they enter the tube, and so the bus spends more of its time actually moving people from place to place.

Similarly, the city installed wheelchair lifts at bus stops rather than on board buses easing weight restrictions and simplifying maintenance—buses with built-in wheelchair lifts are notoriously trouble prone, as are those that "kneel" to put their boarding steps within reach of the elderly. The tube-stop lifts also speed boarding by bringing disabled passengers to the proper height before the bus arrives.

As with subways, the buses have a track dedicated entirely to their use. This right-of-way significantly reduces travel time compared with buses that must fight automotive traffic to reach their destinations. By putting concrete and asphalt above the ground instead of excavating to place steel rails underneath it, however, the city managed to achieve most of the goals that subways strive for at less than 5 percent of the initial cost.

Some of the savings have enabled Curitiba to keep its fleet of 2,000 buses owned by 10 private companies under contract to the city among the newest in the world. The average bus is only three years old. The city pays bus owners 1 percent of the value of a bus each month; after 10 years it takes possession of retired vehicles and refurbishes them as free park buses or mobile schools.

Companies are paid according to the length of the routes they serve rather than the number of passengers they carry, giving the city a strong incentive to provide service that increases ridership. Indeed, more than a quarter of Curitiba’s automobile owners take the bus to work. In response to increased demand, the city has augmented the capacity of its busways by using extralong buses the equivalent of multicar subway trains. The biarticulated bus, in service since 1992, has three sections connected by hinges that allow it to turn corners. At full capacity, these vehicles can carry 270 passengers, more than three times as many as an ordinary bus.

The city managers of Curitiba have learned that good systems and incentives are as important as good plans. The city’s master plan helped to forge a vision and strategic principles to guide future developments. The vision was transformed into reality, however, by reliance on the right systems and incentives, not on slavish implementation of a static document.

One such innovative system is the provision of public information about land. City Hall can immediately deliver information to any citizen about the building potential of any plot in the city. Anyone wishing to obtain or renew a business permit must provide information about the project’s impacts on traffic, infrastructure needs, parking requirements, and municipal concerns. Ready access to this information helps to avoid land speculation; it has also been essential for budgetary purposes, because property taxes are the city’s main source of revenue.

Incentives have been important in reinforcing positive behavior. Owners of land in the city’s historic district can transfer the building potential of their plots to another area of the city—a rule that works to preserve historic buildings while fairly compensating their owners. In addition, business in specified areas throughout the city can city buy permission to build up to two extra floors beyond the legal limit. Payment can be made in the form of cash or land that the city then uses to fund low-income housing.

Incentives and systems for encouraging beneficial behavior also work at the individual level. Curitiba’s Free University for the Environment offers practical short courses at no cost for homemakers, building
superintendents, shopkeepers, and others to teach the environmental implications of the daily routines of even the most common place jobs. The courses, taught by people who have completed an appropriate training program, are a prerequisite for licenses to work at some jobs, such as taxi driving, but many other people take them voluntarily.

The city also funds a number of important programs for children, putting money behind the often empty pronouncements municipalities make about the importance of the next generation. The Paperboy/Papergirl Program gives part-time jobs to schoolchildren from low-income families; municipal day care centers serve four meals a day to some 12,000 children; and SOS Children provides a special telephone number for urgent communications about children under any kind of threat.

Curitiba has repeatedly rejected conventional wisdom that emphasizes technologically sophisticated solutions to urban woes. Many planners have contended, for example, that cities with more than a million people must have a subway system to avoid traffic congestion. Prevailing dogma also claims that cities that generate more than 10,000 tons of solid waste a day need expensive mechanical garbage-separation plants. Yet Curitiba has neither.

The city has attacked the solid-waste issue from both the generation and collection sides. Citizens recycle paper equivalent to nearly 1,200 trees each day. The Garbage That Is Not Garbage initiative has drawn more than 70 percent of households to sort recyclable materials for collection. The Garbage Purchase program, designed specifically for low-income areas, helps to clean up sites that are difficult for the conventional waste-management system to serve. Poor families can exchange filled garbage bags for bus tokens, parcels of surplus food, and children’s school notebooks. More than 34,000 families in 62 poor neighborhoods have exchanged over 2,000 tons of garbage for nearly a million bus tokens and 1,200 tons of surplus food. During the past three years, students in more than 100 schools have traded nearly 200 tons of garbage for close to 1.9 million notebooks. Another initiative, All Clean, temporarily hires retired and unemployed people to clean up specific areas of the city where litter has accumulated.

These innovations, which rely on public participation and labor-intensive approaches rather than on mechanization and massive capital investment, have reduced the cost and increased the effectiveness of the city’s solid-waste management system. They have also conserved resources, beautified the city, and provided employment.

Conclusions

No other city has precisely the combination of geographic, economic, and political conditions that mark Curitiba. Nevertheless, its successes can serve as lessons for urban planners in both the industrial and the developing worlds.

Perhaps the most important lesson is that top priority should be given to public transportation rather than to private cars and to pedestrians rather than to motorized vehicles. Bicycle paths and pedestrian areas should be an integral part of the road network and public transportation system. Whereas intensive road-building programs elsewhere have led paradoxically to even more congestion, Curitiba’s slighting of the needs of private motorized traffic has generated less use of cars and has reduced pollution.

Curitiba’s planners have also learned the solutions to urban problems are not specific and isolated, but rather interconnected. Any plan should involve partnerships among private-sector entrepreneurs, nongovernmental organizations, municipal agencies, utilities, neighborhood associations, community groups, and individuals. Creative and labor-intensive ideas—especially where unemployment is already a problem—can often substitute for conventional capital-intensive technologies.

We have found that cities can turn traditional sources of problems into resources. For example, public transportation, urban solid waste, and unemployment are traditionally considered problems, but they have the potential to become generators of new resources, as they have in Curitiba.

Curitiba’s experiences teaches us crucial principle: there is no time like the present. Rather than trying to revitalize urban centers that have begun falling into decay, planners in already-large cities and those that have just started to grow can begin solving problems without waiting for top-down master plans or near fiscal collapse.