Kentucky's Transportation System: Current Trends and Future Issues

Several current and future trends promise to affect Kentucky's transportation system. These include: the increasing importance of nonmetro public transportation; the increasing dispersion of manufacturing and service industries; the interwoven relationship between the economy, the environment, and the transportation network; the expectation that government should do "more with less" and the challenges this presents for funding the transportation network; information technologies' impact on transportation's administration, planning, and operations; and safety.

By Ted Grossardt
Kentucky Transportation Center

Transportation systems both guide and are guided by people's day-to-day lives. Decisions about where to live and how to connect one's activities are made within an already built environment. At the same time, these decisions affect future investment in that system. The transportation system of tomorrow is then based on the structures and habits of the past, and changed by the conscious decisions for the future. This chapter surveys the problems and opportunities for Kentucky's transportation system, and suggests how they can be managed.

Transportation Issues Likely to Face Kentucky in the Future

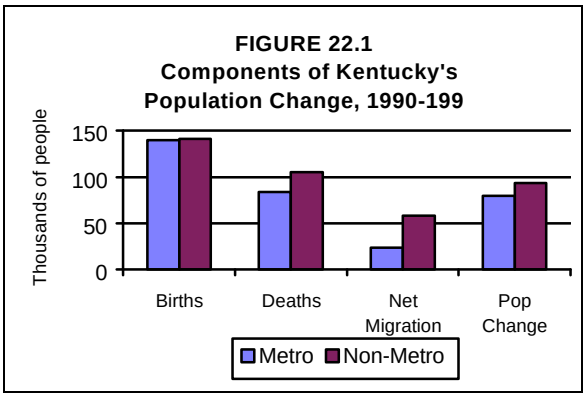
The increasing importance of nonmetro public transportation. Kentucky is a more rural state than the United States as a whole, with just under half of Kentuckians classified as nonmetropolitan in 1990. Like the rest of the country, though, Kentucky continues to suburbanize. These processes have important implications for the transportation system of the state. While projections by the Kentucky State Data Center at the University of Louisville indicate that Kentucky's population will shift toward the central part of the state and the major metropolitan centers, recent population trends (1990-95) show greater total population increases in nonmetro areas of Kentucky (Fig. 22.1).[1] This apparent paradox actually reflects the rapid pace of suburbanization, as most of this nonmetro growth is taking place adjacent to metro areas. At the same time, Kentucky metro areas are similar to other urban areas in the United States. The number of residents in each household is decreasing even as each household paradoxically contains a higher number of workers. The population is becoming more dispersed *and* more urbanized as the population shifts from rural and intercity areas to suburban and fringe metro regions.

Suburbanization has led to a commuter circulation pattern that is circumferential rather than city-centered.[2] With more, smaller households, the commuter pattern becomes increasingly multidirectional. This has several long-term effects. Specifically, more workers drive alone. Indeed, this category of workers increased nationally from 65 percent to 73 percent

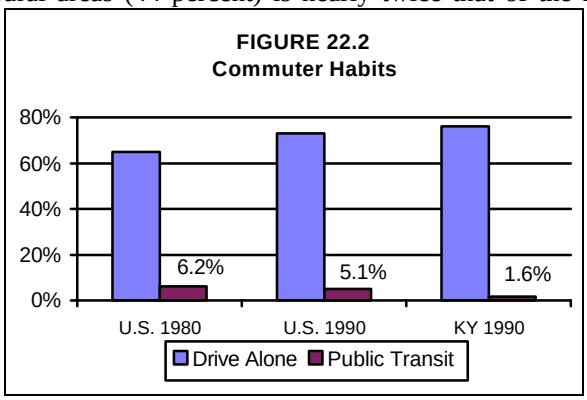
[1] See M. Price, Migration in Kentucky: will the circle be unbroken? in this volume. Also, refer to Price, M., et al. (1995). *How many Kentuckians: population forecasts 1995-2020.* Louisville, KY: University of Louisville, Kentucky State Data Center.

[2] See Volpe National Transportation Systems Center. (1994) *Journey-to-work trends in the United States and its major metropolitan areas, 1960-1990.* Final Report. Washington, DC: U.S. Department of Transportation, Federal Highway Administration, Office of Highway Information Management. [On-line] Available: www.bts.gov/smart/cat/473.html.

during the 1980s, and reached 76 percent in Kentucky. City-centered public transportation systems serve a decreasing proportion of the population of the urban area. Nationally, between 1980 and 1990, public transit use dropped from 6.2 percent of all commuters to 5.1 percent. Kentucky's rate is 1.6 percent—less than one third of the U.S. level (Figure 22.2). Compounding the problem of underutilization of public transportation is the expectation that Kentucky will suffer a total loss of $2.2 million in federal transit operating funds in 1996.[3]



Kentucky's rural public transit providers find much of their clientele supported by Medicaid and Medicare funds, and indirectly by the Social Security retirement system. Kentucky may well be looking forward to a population sorted by age and ruralness, with rural elderly residents contrasted with suburban and younger residents concentrated on a few corridors across the state. Population projections suggest a trend toward a higher proportion of older residents in Kentucky.[4] Already, the proportion of Kentucky's elderly living in rural areas (44 percent) is nearly twice that of the nation (25 percent), and is significantly isolated in many key ways. It is reasonable, then, to expect an increasing need for rural public transit. Unfortunately, federal support for rural transit in Kentucky will be reduced from $3.4 million to $2.7 million in the 1996 fiscal year alone. Necessary fare increases to offset these and other reductions in public transit support would range from 14 percent in metro areas of 500,000 to 1,000,000 up to 73 percent in areas under 200,000 population. Obviously, these are impractical alternatives, especially from the perspective of rural systems that must operate long distances over roads of variable quality. Clearly, rural areas are most adversely affected by these reductions.



The increasing dispersion of manufacturing and service industries. The same process of "dispersion" that the residential population exhibits is mirrored in the manufacturing and service industries which serve that population. Commercial locations that formerly were concentrated in the downtowns are now dispersing throughout the suburban milieu. Likewise, regional shifts in the industrial Midwest continue to disperse manufacturing across the Midwest and into the old South. Facilitating this shift is an increasingly sophisticated system of trucking and intermodal freight that lowers shipment costs and allows movement toward lower labor cost areas. Kentucky has accommodated the placement of new factories, as well as growing commercial transportation corridors connecting the South and the upper Midwest. The result has been a growing truck, rail freight, and intermodal freight network in Kentucky.

[3] See Federal Transit Administration. (1996).*Transit in Kentucky: an analysis of FY 1996 transit funding cuts.* [Online] Available: www.bts.gov/smart/sam/KY5.html.
[4] See G. Rowles and J.F. Watkins, Growing old in Kentucky: the approaching age of age, in this volume.

To remain economically competitive, Kentucky will need an effective transportation network for moving freight. While public sector authority and responsibility is focused on the roadways, all modes (i.e., road, rail, water, air) provide interlinked and complementary services. The public sector cannot afford to be concerned solely with one mode, as changing conditions in one mode will have repercussions for other modes. Nonetheless, Kentucky's freight system relies heavily on the truck.[5] As the first results of the 1993 National Commodity Flow Survey show, trucks continue to surpass all other modes combined in terms of value shipped.[6] In Kentucky, over 75 percent of all commodities (by value) move by truck. Also, the proliferation of just-in-time manufacturing systems has partially shifted the warehousing function of many manufacturers to the transportation system. As a result, the public sector is not only expected to provide adequate space for this inventory on the highway system, it is also expected to move that inventory in a timely manner. More than ever, congestion on the transportation network exacts an economic cost. In a practical sense, the public road system has become part of the manufacturing process.

In the future, the relationship between transportation and the environment promises to become more significant. Conventional wisdom normally dictates that growth in transportation and concerns over the environment are at odds. Professors Stephen J. Goetz and Richard C. Ready of the University of Kentucky explored this question in a 50-state study in 1993. Their findings indicated higher rates of economic growth in states which showed higher concern for environmental quality. In short, environmental quality need not be seen as the antithesis of economic growth.

Intelligent use of energy resources for transportation is critically important when seeking a balance between the two objectives of economic growth and environmental quality. Of all the energy used within Kentucky, roughly one third is used on transportation. The typical Kentuckian travels alone and drives 10,000 miles each year. All travel by Kentuckians consumed approximately 69 million barrels of petroleum during 1992 alone. This reflects a long-term increase in petroleum consumption of 176 percent since 1960. According to a 1994 study, 29 percent of Kentuckians (1.06 million) live in counties that have been designated as nonattainment areas for recommended levels of ozone. Carbon monoxide is a major cause of ozone depletion, and levels in Kentucky have been steadily decreasing since the 1970s, courtesy of newer, lower emission autos.

In order for Kentucky to remain a desirable place to live in the future, policymakers will be pressed to identify ways to make transportation more amenable to the already fragile environment. One way to accomplish this is by implementing ways to travel "smarter." An example is the Advanced Regional Traffic Interactive Management and Information System (ARTIMIS). This system is being built in the northern Kentucky/Cincinnati nonattainment air quality area. With ARTIMIS, travel time and congestion may be avoided by merely tuning a radio, observing electronic road signs, or by dialing a number on a cellular phone and listening to up-to-the-minute interstate traffic information.

Policymakers will be challenged to finance the transportation system as government is expected to "do more with less." New establishments have come to expect truck service virtually anywhere, but this expectation is unrealistic and places unusual demands on the Kentucky transportation system. Private capital has outrun the capacity of public finance to support its movements. Many local roads in Kentucky cannot accommodate 102-inch wide

[5] Bureau of Transportation Statistics. (1996).*Freight transportation in Kentucky: selected data from federal sources.* Washington, DC: U.S. Department of Transportation.

[6] Bureau of the Census. (1996).*1992 census of transportation, communications, and utilities: 1993 commodity flow survey, Kentucky*. Washington, DC: U.S. Department of Commerce, Economics and Statistics Administration. [On-line] Available: www.bts.gov/cfs/prod93.html.

and 53- or even 57- foot long trailers, and the public resources do not always exist to make the upgrade investment.

Kentucky's initiatives to support local economic development with transportation infrastructure may require better coordinated planning. While economic development activities are considered *most* desirable in areas with the *least* current activity, such areas are likely to also be *least* prepared for heavy truck traffic, and so require the heaviest public sector investment. Strategies to address the need for development must also recognize the limitations of public sector resources. To date, well-planned industrial parks have been the best strategy for dealing with the problem and opportunity of economic development. They provide the complete complement of public sector utilities needed by industry, location along truck-capable highways, the potential to encourage railroad use as a supplement to truck traffic, and are an important, tangible expression of support for economic development by the local community.

Yet, while the expectations for a world-class transportation system have continued to rise, the method of paying for it has not kept pace. The current finance system is designed to use fuel and vehicle-based taxes to pay for anticipated maintenance and improvements on the highway system. Under current user fee arrangements, it appears the Road Fund plus Federal Fund will marginally be able to meet most of the requirements now incorporated into the Six-Year Plan plus half of the Long-Range Plan of the Transportation Cabinet. It is important to note, however, that state road funds are restricted by the Kentucky constitution to highway uses. Consequently the public sector is ill-equipped to fully exploit the potential of an integrated transportation system. The Intermodal Surface Transportation Efficiency Act (ISTEA) has encouraged the search for solutions to this long-standing problem. Good potential exists to relieve pressure on highways by assisting in the movement of traffic onto rail and water, but the public sector currently has few tools to facilitate that process.

While the expectations for a world-class transportation system have continued to rise, the method of paying for it has not kept pace.

One finance strategy compatible with current constitutional restrictions is *congestion pricing*. Congestion pricing encompasses a variety of strategies, including fee-permitted zones for certain vehicles at certain times of the day, or more sophisticated automated tracking and billing techniques based on Geographic Positioning Systems or ground-based monitoring techniques. Congestion is already paid for in wasted time and accidents. A responsible transportation management scheme would begin to explore ways to use a true pricing model to avoid congestion and use the savings to upgrade the transportation system appropriately.

Current and emerging transportation information technology will continue to affect transportation administration, planning, and operations support. Administrative systems are vital to maintain the effectiveness and efficiency of the regulatory agencies they support. Further, they provide much of the backbone upon which other systems can be integrated. Kentucky has a fairly robust network enabling access to key databases, communication via electronic mail, and file transfer. Additionally, the Kentucky State Government network is connected to the Internet, affording a much larger "information marketplace."[7] Nevertheless, there are a number of emerging technologies that can make this effort more effective.

Digital Orthophotography, for example, has the potential to provide detailed information to verify and correct the location and nature of transportation routes and land use locations, including such hard-to-verify sites as coal tipples.

Kentucky's Transportation Cabinet is continuing to support and expand its Highway Information System by linking it to a *Geographic Information System* (GIS) to facilitate spatial

[7] See D. Robinson, Information technology: perspectives and trends, in this volume.

portrayal and analysis. A GIS is essentially a software tool which allows the spatial representation of data. That information may pertain to any sort of topic and be arranged regionally (as in land use); linearly, as in highway, rivers, roads, or railroads; or in sites, such as accidents, bridges, intersections, and buildings. A GIS is also useful in allowing the juxtaposition of data otherwise difficult to compare: potential road construction sites and wetland locations; traffic generators and high-accident-rate locations; highway rockfall locations and geomorphological structures; accessibility to bus routes or major transportation corridors; and demographic profiles. Such "overlays" provide insights that would be difficult or impossible to infer using any other means.

Another technology, still in its infancy in Kentucky, is the use of *Global Positioning Systems* (GPS) to help locate places and events in Kentucky's growing Geographic Information System coverages. Because GPS has the ability to quickly and unambiguously locate an event, it can be used to locate events such as traffic accidents that now rely on written records which must be transcribed by hand. It can also be used in real time to track the location of commercial vehicles, traffic accidents, fires, and congestion problems that impact the operation of a transportation system.

Ultimately, the goal of transportation technology applications is to make transportation more efficient. In recent years a comprehensive national program of transportation technology development has been pursued under the rubric of *Intelligent Transportation Systems (ITS).* At the core of ITS is the realization that transportation safety and capacity problems cannot be solved solely by new construction. Using new technology to more effectively manage existing systems, however, offers many benefits with lower costs.

Kentucky is nationally recognized as an early leader in the development and deployment of numerous ITS projects. Most noteworthy is the Advantage I-75 Mainline Automated Clearance System which integrates weigh-in-motion (WIM) technologies, read-write electronic transponders, and high-speed networks to improve commercial vehicle operations on I-75. Further, this program—built around an expanding partnership of six states; Ontario, Canada; and industry representatives—demonstrates how public-private partnerships can be leveraged to deploy complex technology.

Public transportation technology applications have two broad goals: improved ability to express demand and stronger capabilities for managing service provision. This translates into software/hardware combinations that automate client location, bus routing, fare collection, fleet management, and bus location monitoring. As with other technologies, the more sophisticated versions of these rely on GIS/GPS combinations. While some urban transit systems have begun to explore these capabilities, they may have strong benefits for regionally extensive, rural, demand-based systems. Combined GIS/GPS systems can be used to track and schedule buses. The patrons can use "smart cards" to validate and pay for their rides, and the information from those cards can feed accounting and maintenance information systems to improve the manageability of rural transit systems. The role of rural transit systems may well expand with the devolution of welfare responsibilities to the states. Low-income people needing to reach their jobs may not have the resources to provide reliable transportation, and the state may find it strategically useful to provide transportation services that assist social service agencies. Information technologies for managing this new demand will become more important.

Safety issues will continue to confront policymakers in the future. Trends in the safe use of Kentucky's transportation system are best assessed through consideration of the influences of alcohol, age, and safety belts. In Kentucky, alcohol-related accidents cost about $101 million annually. Through increased enforcement efforts, Kentucky's alcohol-related accident rate has dropped steadily for the past five years. Lowering the BAC (Blood Alcohol Content) limits from .1 percent to .08 percent could continue to point this trend in the proper

direction. The teenage accident rate continues to be three times the teenage license registration rate. Kentucky's graduated driver licensing law, one of the few of its kind in the country, limits the hours of driving and BAC for teens more severely than other drivers, but has not been in effect long enough to evaluate. Also, safety belt usage in Kentucky has increased dramatically from 4 percent of drivers in the early 1980s, to over 50 percent currently. There is room for improvement here, though, as North Carolina's more stringent enforcement standards for safety belts have produced a usage rate more than 20 percent higher than Kentucky's.

Conclusion

Transportation makes possible many of the transactions of everyday life. If people and shipments are expected to be on time, and the state is expected to facilitate this, then Kentucky may need to find creative ways to move people and goods. This includes current efforts to improve the efficiency of traffic across the network, but should also include exploration of ways to complement the capacity and efficiency of the system through load sharing with other modes. The current financing system will pay to maintain and continue the current transportation system, with the attendant problems listed in this chapter. A funding mechanism that requires unimodal construction moneys without explicit consideration of modal complements is not market driven, however. A reasonable strategy might include the use of new technologies to better manage access to the transportation system, and more intelligent planning to take advantage of the multimodal possibilities already existing.

There are several steps Kentucky's policymakers can take to ensure a robust transportation network well into the future:

- Provide a mechanism for the optimal use of public sector funds across *all modes of transportation.* Under ISTEA legislation, the federal government has already established a precedent for such flexibility.
- Pursue an expanded *Transportation Planning* curriculum in Kentucky's universities. The increased private and public sector investment in logistics and transportation management as an aspect of an effectively operating manufacturing or transit system is not being formally accommodated by current curriculums.
- Continue to expand participation in *regional management systems* based on regional economic processes, such as the Commercial Vehicle Information Systems and Networks projects currently being pursued by the Transportation Cabinet and the Kentucky Transportation Center.
- Support the incorporation of *intelligent transportation technologies* into transportation management as rapidly as possible. This will benefit nearly every existing mode, and may have particularly salutary effects on rural transit, where increasing demand can reasonably be expected.
- Plan now for strategies to address the *increasing need* for rural transit, including an aging population and increased state responsibilities for welfare reform.
- Broaden support for *functional coordination* of transportation and land uses. Planning ahead for industrial parks, schools, airports, and housing developments will help the state to use its scarce transportation resources to its best advantage.

Kentucky has become recognized as a regional transportation leader in the United States, and has recently been called on to demonstrate and lead important new regional projects in the adoption of ITS technologies for the surrounding states. Let us not forget to apply that hard won expertise at home.