A change of direction...

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HAROLD WORRALL looks at the correlation of congestion pricing and transportation technology

In the US the automobile provides the vast majority of passenger trips and increasingly freight movement is dependent upon the truck.

Today, 84 per cent of total freight value travels over the roadway system. This predominance of the rubber-tired vehicle has occurred over the last three quarters of a century when gasoline tax was the predominant funding source for transportation.

Most involved in transportation policy have begun to realize that pricing transportation through tolling is necessary if we are to modify traveler behavior and generating sufficient revenue to improve and maintain transportation facilities.

This major shift in direction is occurring slowly in the US, but with certainty.

With so much at stake in the policy debate, technology stands as the single factor that will make many of the proposed alternatives possible. Without Electronic Toll Collection (ETC) perhaps the transportation pricing debate might have been quite short.

The ability to pay tolls without stopping and to do so accurately has resulted in new financial strategies for funding transportation and had made pricing more acceptable to the customer. ETC has made it possible to implement demand management strategies. Though this relationship appears to be somewhat inelastic, the potential to affect travel demand remains. The potential strategies available for generating transportation revenue and affecting travel demand are just beginning. Whether considering concession arrangements, implementing HOT lanes, modal sharing of revenues or formulating new local delivery organizations toll collection technology has played a part in making these options possible.

With the advent of Open Road Tolling (ORT), All Electronic Toll Collection (AETC) and High Occupant Toll (HOT) lanes, transportation policy options are broadened considerably.

Making concessions

Technology will also affect the nature of transportation organizations. As the focus shifts from managing those involved in manual cash collections to organizations involved in the implementation of new technologies, the potential exists for further out sourcing and privatization of major functional areas and perhaps leading to an expansion in the use of concessions.

Though most transportation facilities are inherently considered public goods and that they should be provided by public agencies, concessions are more likely to price transportation closer to its true value.

We are accustomed to pricing water, sewage treatment, electricity and other essentials to modern living and interestingly many of the providers of these services are provided by private regulated utilities intended to make a profit and ensure that the public interest is protected.

Protect and survive

The motivation of the public and private sectors are different. Clearly, the private sector is motivated by efficiency and resulting profit. In contrast, the public sector is interested in equity and ensuring social justice , defined by John Rawls to be the "protection of the minimum".

If profit is the singular motivation and no regulation is applied, toll rates would be set to maximize profit. If the same facility is operated by a public entity, the goal is to ensure that as many of the citizens as possible can afford to use the system and as soon as possible to remove the tolls and make the facility "free".

These choices and options are made available by having the technology to collect

revenue without stopping. Technology also has affected the public relations process and the ability to influence customer preferences through communication. Toll operators now know who their customers are. They have access to their customer's mailing addresses, phone numbers and financial information.

With this new access to the customer comes the responsibility to treat their information as customer information and not public information.

Making ends meet

Technology has also altered the toll operations cost equation. Operations costs vary widely but offer the potential to be much less. ETC reduced manual collection costs but replaced much of the savings with back office costs.

Dramatic cost reductions could result from the conversion to All Electronic Toll Collection, AETC. AETC operations costs can be especially low when they are designed into the facility from the beginning. Several AETC operations exist in the world today and many are concessions.

New pricing strategies such as dynamic toll pricing, congestion charging, HOT lanes and other pricing strategies have been made possible by technology. New technologies for electronically determining vehicle occupancy are in the prototype stage and will make it possible to implement HOT lanes widely without potentially high violation rates or large enforcement costs.

A private matter

However, technology presents some new challenges. One of the most significant of those is privacy. Technology can provide a wealth of information on a person's location, time of day, and vehicle being driven in addition to personal data that is stored. It is critical that any technological applications protect the customer from others accessing any of this information.

Though it is not likely that RFID will be replaced as the mechanism for ETC in the near future, new technologies may someday offer a more seamless way to collect tolls. To charge a direct user fee only three pieces of data are required, i.e. vehicle identification, location of the vehicle and toll rate. Cellular phones are capable of determining location through a process of triangulation and global positioning satellite (GPS) equipment is used in Germany to determine position.

Technology offers many opportunities but solutions must fit the political and economic realities of the state or region in which it is applied. Frequently tolling solutions are applied to a portion of a roadway network and the implications on the surrounding network and other modes of travel are not considered.

It may be a sound strategy to price a major roadway using state of the art technology but it should be done in the context of the transportation system overall. Because a project makes sense fiscally does not mean that it makes sense socially or politically.

Eliminate, implement

What new technologies offer the greatest potential for transportation pricing? The movement toward AETC has been discussed and lamented as possessing too much risk for many years.

Each new technological solution is evaluated with the hope that risk can be eliminated and AETC implemented. In the end it is highly unlikely that any technology will prevent revenue loss from conversion to AETC. What is more likely is that improvements and adaptations of existing technology will lead to the next great leap in operational savings.

We have begun to understand that a small portion of frequent customers generate the majority of toll revenue and that a large portion of infrequent customers generate a small amount of revenue. Some have come to realize that new products have to be offered to the infrequent customer that fit their needs for convenience and cost.

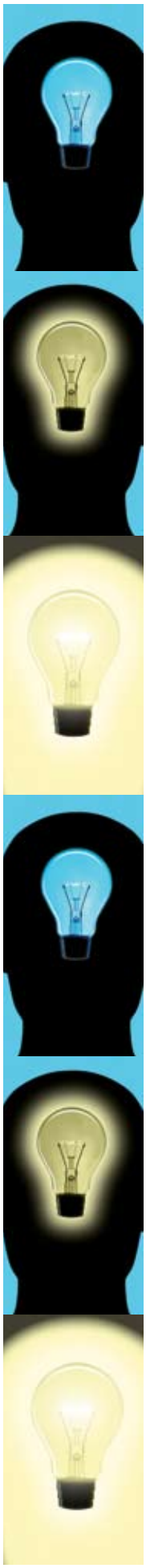
Video tolling has been in existence as a concept for years but has not been used as a prominent method of collecting tolls. The perspective is one of violations processing. However, if the idea of paying by license plate is viewed from the perspective of a new toll payment method, the result is a strategy for attracting non-ETC customers to become prepaid account holders.

They just don't have a transponder. Infrequent customers are also willing to pay a higher toll per transaction in exchange for the added convenience. Some have even considered using a cellphone as a means for setting up an account, maintaining the account and paying for the transaction from phone balances.

This can be accomplished through a single phone call using a text string that is stored on the contacts list in the cell phone. A single phone call could serve to set up or top up the account.

Caught on camera

Video tolling is simply identifying the owner of the vehicle and therefore the party responsible for paying the toll by reading the license plate. License plate identification



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technology has improved significantly as image quality has increased and camera triggering has become more accurate.

Optical Character Recognition (OCR) has improved and more images are therefore processed without human review, minimizing costs. New approaches such as "fingerprinting" license plates have begun to be used.

This technology simply records the specific digital image (towing balls as well) and once a license plate is identified that plate number is used in the future for images exactly matching the fingerprint. All of these technologies offer great promise for video tolling.

Another strategy for attracting the infrequent customer is to make it easier for the customer to buy and activate an ETC tag. For years several agencies have been selling tags through retail outlets.

However, the information needed to activate the tag is the same as if it were purchased at a tag store and the tag must be loaded with some toll value after the purchase.

Some have begun to consider discounting the tag cost, loading tag value and selling it retail.

This "lite" version of ETC gives the customer the convenience of quickly activating the tag by simply calling a specific phone number and keying in the tag identifier. The process is much simpler and quicker, resulting in a greater proportion of trips being paid by prepaid ETC tags.

Standard fit

Discussions are underway amongst the automobile manufacturers to install transponder devices at the time of manufacture.

If this occurs, the transponder could become a ubiquitous device. Such an event could change the future of transportation. Privacy will be a major consideration and the device will most likely have to be activated on a voluntary basis by the owner of the vehicle.

New technology will continue to be developed and ultimately an all electronic toll collection environment will be reality.

The limiting factor will, however, not be the technology but the political, societal and individual acceptance of the technology by the traveling public. TH