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NEW INFORMATION AND TELECOMMUNICATIONS TECHNOLOGY IN THE TRANSPORT SECTOR

The growing use of e-commerce and the need to generate efficient solutions to problems such as traffic jams and the physical distribution of merchandise have created a new scenario for transport in general, particularly in urban areas. Because of this, the application of new information and telecommunications technologies presents a strategic challenge that enables maximum advantage to be obtained from the deregulation of markets and the opening up of economies, as well as addressing other urgent needs of this sector.

This issue of the Bulletin is based on a study of the application of information and telecommunications technologies to fleet management and urban transport, being carried out by the ECLAC Transport Unit. Although the study focuses on the impact of these technologies in such fields, its reflections, analysis and conclusions are also applicable in other areas of the transport sector.

For more information on the study or regarding technologies applied to transport in general, please contact Gabriel Pérez: gperez@eclac.cl or visit the on-line Panel on Technology Applied to Transport (in Spanish) <http://www.eclac.cl/transporte>

A NEW SCENARIO FOR TRANSPORT

One of the main impacts of the increasingly widespread use of Internet and e-commerce has been the elimination of intermediaries. Transport, however, along with insurance and on-line payment systems, have been declared vital to e-commerce, generating new business opportunities in these sectors to the extent that they can adapt to the requirements of a market that demands speed, quality, information and versatility.

The dominant competitive forces in the transport sector will require the systematic introduction of new technologies associated with telecommunications and information technologies, known as “telematics”. This incorporation, along with the efficient use and distribution of the information thus provided, will make the difference between those companies able to benefit from the new environment and those that will find gradually themselves displaced from the market.

TELEMATICS AND URBAN TRANSPORT

The use of telematics is vital for the survival and prosperity of companies confronted with market deregulation and the general opening up of economies. It provides a highly relevant tool for controlling routes, managing public transport and efficiently administering fleets in these areas the suitable and coordinated use of telematics could reduce commuting times and distances, as well as improving the safety, comfort and set of services offered to users and clients, as the following table illustrates:



TRAFFIC AND ROAD INFORMATION

Road signs often provide redundant, contradictory or out of date information. VMS (Variable Message Sign) Telematic systems are designed to correct this situation, allowing the same panel to provide information updated by remote control from an operations centre that receives and processes field information picked continually up by sensors on main roads. This enables users to choose the best route based on up-to-the-minute information, thus reducing delays by around 20%.

MODERN MANAGEMENT OF PUBLIC TRANSPORT

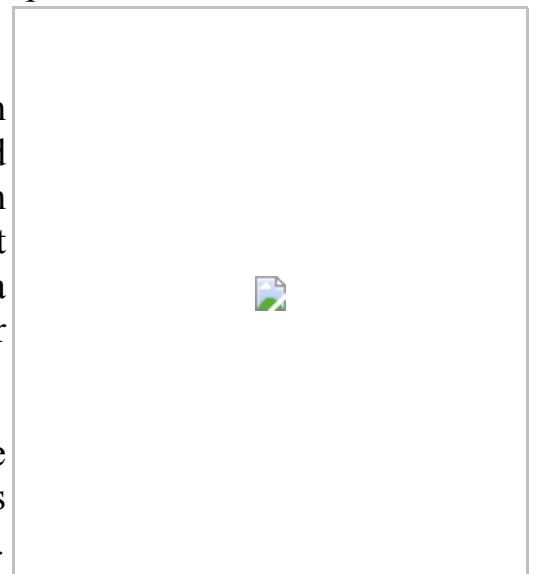
Urban authorities make a major effort to encourage the use of public transport instead of private vehicles. This entails guaranteeing mobility through a high-quality public transport system, which uses an economically attractive fare structure which provides adequate integration between the various components of the public transport system, guarantees simple transfers using integrated payment systems, operates to predetermined published schedules of frequencies, and adapts the fleet to changing demand patterns throughout the day.

All this can be achieved through ITS (Intelligent Transport System) applications. These receive and process information captured by different telematic applications, providing general solutions to ensure the best use of transport systems and support both user and network operator decision-making. Typical applications are vehicle location through Global Positioning Systems (GPS) and data integration using a Geographic Information System (GIS – See more detailed explanation at the end of this issue), priority on the traffic flow for public transport, passenger information systems, and systems for regulating frequency according to the prevailing demand. Among its advantages, researchers have found a significant reduction in commuting time, mainly for the users of public transport, better use of the operating bus fleet and, from the environmental perspective, savings in fuel and a decline in pollution emissions.

In Germany, the United Kingdom and the United States, to quote a few examples, ITS applications are already being used to manage public transport, locate vehicles automatically using real-time GPS, in order to control times and vary frequencies when some unforeseen event occurs.

Moreover, the technology provides passengers with information on travel time, continuously updated expected bus arrival times every stop, and traffic conditions, through interactive kiosks where commuters can enquire about routes and buy tickets, as well as at bus stops and via Internet (See Figure 2). This way users can plan their movements better.

Users assessments of systems in these countries have been positive, indicating that the information provided has helped users to make better use of their free and travel time.



AUTOMATIC PAYMENT OF FARES AND TOLLS

It is particularly important for companies and authorities public transport systems to

provide mechanisms that make it easier to pay fares, as well as improving the safety of fare collection processes. Current available technology, mainly smart cards, make this possible, as well as permitting transfers without having to buy additional tickets, while still dividing income between different operators according to predetermined scales.

By correctly managing the information contained on cards, operators can administer their fleets better, reinforcing them during peak demand hours, on the basis of information from primary sources. The use of the intelligent or chip card is becoming common in many cities, because it serves as an electronic change purse, permitting the payment of other services, as well as being capable of absorbing technological changes and lasting for up to four years.

In Finland in 1995 a system of this nature was applied and today the same card can be used on any one of 5,000 buses that form part of the national public transport system, operated by 400 private operators. In Latin America, there are already some initiatives of this nature, for instance in Chile, Colombia, Costa Rica and Honduras.

In Hong Kong, the number of cards in circulation has reached six million and they are used not only for travel by metro, streetcar, bus or ferry, but also to pay for parking and in a wide range of different vending machines.

Another application being developed and publicized is the electronic toll systems, which have gradually come into use in many countries in Latin America and the Caribbean, generally associated with road improvements carried out by concessionaires. A manual tollbooth can handle some 250 vehicles per hour, while an electronic toll system can handle up to 1,800 vehicles per hour.

EFFICIENT FLEET MANAGEMENT

Efficient fleet management is perhaps the most interesting application for telematics, since by using GPS and GIS it allows operators to monitor routes and vehicles at all times. This provides greater control and better management of fleets, given that the system can report unauthorized stops, the opening of the cargo compartment, and vehicle speed, among other events. Information is sent in real time to an operations centre, where the vehicle appears on a digital map, with its location, the time and duration of an event, and other programmable data. If this is associated with a mobile communications data system, up-to-the-minute information on traffic conditions or changes in the previously planned route can be provided to drivers according to shifting demand, reducing dead time in the handling of dispatches by around 37.5% and service delays by around 35%, which is, for example, of special interest to messenger services.

Recent European studies of satellite tracking of fleets and mobile data communication systems have established that the investment can be recovered within three years and its use involves only a slight increase in transport costs per vehicle of US\$1/1,000 km.

GPS AND GIS FUNCTIONING

GPS and GIS together with radio frequencies constitute the technologies that sustain most telematic applications, particularly ITS. This makes it important to understand what they mean and how they operate, in simple terms.

GPS, Global Positioning System, provides precise information on the location of a vehicle at any point on the planet, using geometric triangulation, which enables the determination of the exact position of a body if one has access to the right coordinates and distances are known. Because of this, GPS uses four precisely located satellites whose position is known at every moment. Three structure the coordinate system while the fourth provides redundant information to permit correction of any errors. To measure the distances from the axis to the vehicle, GPS uses radio waves to determine the distance from each satellite according to the time it takes a signal to reach the GPS receiver located on the vehicle.

GIS, Geographic Information System, is a computer application that integrates and uses information provided by GPS, turning their data into information useful to the end user, thus facilitating analysis and decision-making. A GIS is a multi-dimensional, geo-referenced database, in which every measurement or piece of data received is associated with a geographic point or coordinate. When questions are asked, this information can be provided in graphic form as a map, complemented by additional information.

CONCLUSIONS

Technology alone does not solve problems, although its systematic and coordinated use by the public and private sectors can help to do so. It is not enough just to seek out the appropriate technology. One must also know how to use it in ways designed to solve problems currently facing Latin America and the Caribbean. The main problem isn't just having the technology, but how to optimise its use in applications that have been developed and implemented to deal with issues facing Latin America and the Caribbean.

To date, the region has displayed no major initiatives in this area, with just a small group of ideas and specific projects underway, which lack the coordination that could contribute synergies and generally applicable system benefits. It is therefore essential to generate projects that permit the analysis and implementation of technological systems adjusted to our own needs and budgets. This requires coordination of initiatives aimed at developing national standards in order to ensure the integration of regional transport, giving priority to open architectures, rather than proprietary solutions that make it difficult to include new applications later.