

SURFACE TRANSPORTATION IN THE SOCIETY OF TOMORROW

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I. *Technological and Economic Trends.*

The authors are not lawyers. Rather, they have technical and economic backgrounds. It was, therefore, felt that the greatest service which could be performed in this article is to sketch the technological and economic trends which are likely to characterize transportation in the coming decades. This should suggest the legal and regulatory issues which society and the legal profession will have to consider.

First, what are the economic parameters? Throughout the period which commenced with the industrial revolution, substantial effort has been made and significant success has been achieved in overcoming the impediments posed by distance in the exchange of goods and services. There is no doubt that economic development would not have occurred to the extent it has—both nationally and internationally—without these basic changes. Population growth, specialization by individuals and areas and the resultant increase in productivity, capital formation and its effects on productivity, have all been fueled by evolution in surface transportation. If land transportation was still performed by horse and wagon, and water transportation by sailing vessels, the type of industrial society we have today would be impossible, virtually all of society's resources would have to be devoted to transportation, giving rise to an industrial-transportation equilibrium at a considerably lower level of output than is the case today.

What have these changes been? First, the application of steam to locomotion on both a guided track (land) and by sea represented an enormous break-through. By lowering the real cost of providing transportation, North America developed as an agricultural area to permit industrial concentration in Western Europe. Concentration by region within the developed areas also took place.

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The second major development was the application of the internal combustion engine to single vehicle concepts in transportation, giving rise to trucking and bus transportation. The third has been the steady improvement in technology of all kinds—rail, highway, pipeline and water, which has supported scale economies arising from increased size. Longer trains, bigger ships, bigger tractor-trailer combinations and larger diameter pipelines have characterized surface transportation in the post war years, and have had an enormous effect, through productivity gains, in enhancing international and national specialization.

These developments have taken place through a competitive market structure, particularly since the internal combustion engine forced development of the trucking industry in the period since the end of World War II in Canada. Shipping and trucking are both highly competitive industries, and competition from these industries has forced competitive adjustment in the railway and pipeline fields.

The challenge of our regulatory and legal processes during this period has been to accommodate law and regulation to the changing economic structure of the industry. The adjustments made in Canada in the past dozen years has established leadership for Canada in this area. Transportation companies with an incentive to use the best technology in a given market have been possible in Canada, but have been seriously hindered in many other countries. In the United States, for example, transportation law has failed to evolve quickly enough to facilitate changed economic and technological circumstances in transportation.

What of the future? To present a picture of surface transportation in the future, some ideas and concepts known to be within the scope of present technology have been projected forward in the direction of known trends. While the pace of this advancement is unknown and likely unpredictable, this article attempts to draw a picture of transportation in the period roughly thirty years in the future as it appears to the authors.

Surface transportation in the future will be less identified with particular modes of transport and increasingly identified with the commodity being transported. Instead of being sharply defined as water, rail, pipeline, truck or bus transport, the precise mechanism of transport will become fairly obscure and instead transportation will be categorized by station-to-station versus door-to-door; high speed versus low speed; mail and packaged freight; bulk materials; energy; and, of course, people. To discuss these, the priority in which they are often viewed by the public considers people first. If the discussion is narrowed to exclude the automobile or private transport and on the basis of an assumption that in considering people movement by surface transport we are really only consider-

ing the domestic market, then in urban areas we can consider the full range from moving sidewalks, bus and subway-like vehicles and high speed inter-urban transit systems. People travelling extremely short distances such as between buildings can be expected to be carried on moving sidewalks much the way the escalator is now used for vertical transportation over short distances. For slightly longer distances, a parallel may also be drawn with the conventional passenger elevator where a cab-like vehicle travels between a fairly small number of discrete points automatically and on command from passengers wishing to use it. Many of these devices are in the development stage now under the term "People Movers". While in buildings this type of vertical conveyance is usually limited in present structures to say a maximum of 100 stories or 1,500 feet, the same type of conveyance operated horizontally could well cut through the dense downtown areas providing transportation for distances of perhaps one mile.

Obviously such a system presents new legal perspectives from the ownership and operational points of view. Longer distances including those which might be covered by "horizontal elevators" would logically be covered by bus-like vehicles, some of which might be wholly automatic and some much as we know them today although in all probability, electrically powered. In this range of distances, which might be defined as one mile to ten miles, would also be found tracked vehicles such as conventional subway cars and more exotic tracked systems—monorails, tracked air cushion vehicles and the like. These vehicles will also differ from the horizontal elevator in that they will include larger numbers of passengers and generally travel at a higher speed. The inter-urban transit field operating in the range of five to fifty or one hundred miles would be an extension of similar types of vehicles, either operating deeply underground or overhead and at speeds up to 200 miles per hour or more. In addition, there will be developments of high speed inter-city services covering distances of 500 miles in two hours or so.

In the field of freight transportation, a distinction should be made between domestic and international transportation. When it comes to transporting packaged goods, mail and small items of freight domestically, one can expect more differences in the means of transport for different environments and markets than for different types of goods. In dense urban areas, as with passenger transportation, conveyors either as moving belts or as containers or capsules will probably evolve from hand carried and truck delivery. In less densely populated zones, small and medium sized trucks on rubber tires will continue to be the primary means of distribution. Many of these vehicles will be driverless and, no doubt, many will be electrically powered. For longer distances the

"container" capsules or package-carrying box on the small or medium sized truck can be expected to be handled in multiples on larger truck-like vehicles or grouped for transport on single car or multiple car self-propelled and automatic freight trains. In the international transport of such products, there seems little doubt that the principle of containerization will continue to dominate overseas transportation for many years to come.

For both solid and liquid homogeneous bulk materials, moving domestically, there will undoubtedly be developments in the use of pipes of all kinds. Industrial areas might be served by a general pipe system capable of moving many types of bulk materials and switching them by means of valves to particular destinations. Some types of materials may not be safely intermixed and capsule techniques as presently envisaged for some solids pipelines could provide the special transportation for commodities. Clearly, ownership and operation of such a pipeline introduces some special problems not presently envisaged in the transportation industry. There are whole new concepts of rights-of-way, responsibility for billing, collections, safe delivery of goods, payment, handling of return goods or materials, identification of source of supply and destination and insurance responsibility for, or ownership of, goods in transit.

Another commodity sometimes considered as a material to be transported is energy. In its various forms, energy can be transported as coal, as oil or fuels in pipelines, as gas in pipelines or as electric power on wires. These various forms of energy tend to substitute for one another and in the period beyond thirty to one hundred years in the future we can look forward to most energy being electrical. While the transmission of hydrocarbon fuels in pipelines and by ship is common today, the trend is likely to be a peaking of these means of transport in fifteen years or so and a substitution of the forms of energy, bringing about a marked change in the mix of modes presently used to transport these materials. One possible exception to this trend is that hydrogen gas may well replace liquid and gaseous fuels for some purposes such as fuels for vehicles and aircraft and would be generated from electric power plants. However, since hydrogen is so easily manufactured, the likelihood is that no appreciable transportation requirement for it, other than short distance piping, is in the cards.

The transportation of bulk commodities by water is likely to characterize growth in non-energy markets, internationally. Bulk carriers are not likely to get much larger than the largest such vessel today, but the average size vessel is likely to increase materially. There will undoubtedly be a significant growth in tug and barge transportation. Bulk carriers will undoubtedly become more specialized than is the case today.

In summary, in the field of passenger transportation, there will

be a number of specialized types of conveyances tailored to very short, short, medium and long distance travel that can be categorized both as to distance and to the velocity of motion. A passenger travelling from his home to his place of work may well use all of these types of conveyances starting with the short distance, slow moving one, advancing to the fast moving, long distance one, and then back to the slow moving, short distance one at the destination. All of the individual's travel would be considered multi-modal, a present way of looking at it, and each of these modes would be specialized to suit a particular part of his travel, generally not in competition with each other.

In summing up the transportation of package freight, merchandise and general commercial commodities, as with passenger transportation, its movement will be categorized by the distance over which it will travel, moving by a single mode if over a very short distance and by two, three, four or more modes in ascending and descending speeds and groupings of quantity of units.

Bulk materials in small quantities will probably continue to be handled in packages, bags, drums or the like, and in large quantities in special or in general-purpose pipe distribution systems. If moved in packages they will be handled as other types of merchandise freight and if moved in bulk, will be handled much the way water and fuels are presently moved today.

Energy will not likely continue to be moved as a bulk commodity very long into the future but rather, will be transmitted as electric power and moved as a very high energy fuel such as uranium.

Transportation in the future, then, is likely to be more characterized by the commodity and by the distance over which it is to travel than by what we now consider to be specific, well defined modes of transport. Clearly, there will continue to be differences for transportation over land and over water as to the type of bearer vehicle or vessel, but the terminal and inland handling and the point-to-point nature of shipping will be more sophisticated in the future. Shipping and distribution requirements of industry will result in evolution away from the conventional separate modes of transportation.

II. *The Influence of Law on Transportation.*

Creation of surface transportation on land tends to follow the development of government policy, enabling legislation, financing legislation and regulatory or operating franchise legislation. Whether the new transportation created is the construction of new railroad lines, the building of a highway or the licensing of a new type of transport vehicle, this process is followed. Public policy may arise from the desire to exploit natural resources for export, cater-

ing to the needs of an industrial society or for provision of safer and more comfortable transportation and facilities for the citizens at large. The progress through these steps seems obvious, and so long as the easiest path to follow is the one which benefits society and the economy in the opinion of the public, then no particular problems are encountered. The administrative unit which is to construct and operate the transportation network created may be one financed by government, financed as a public stock company (or ordinary corporation), a crown corporation, or a combination in which construction or operating subsidies or both may be required. Government guarantees of interest on debt have been common as a means of financing transportation by both types of corporations. The authors might define the ideal corporation as one in which the best service to society is provided through aggressive pursuit of optimum efficiency, including economic efficiency. While this ideal is difficult to achieve in a practical sense, it is approached in our commercial society through the creation of suitable boundaries for the operation of the corporation and incentives which place corporate aims in parallel lines with those of the government and society. Transportation companies are particularly good examples of this relationship although by present needs of society, are over-regulated in many areas.

III. *Flexibility and Achieving a Balance.*

Consider the situation in which, for example, a new bus or public passenger transportation service may be desired by the residents of a town. Private individuals may be willing to advance the capital necessary for the purchase of equipment and start-up costs of the system and to protect their investment the exclusive right to operate the system on a monopoly franchise is granted that company for the territory which it is intended to serve. If the service is unprofitable, and the private owners cannot cover the reasonable cost of their capital out of earnings from the system operation, then either the service or rates must be adjusted until an economic level of income is met or the municipality must decide that the social value of the service justifies covering some of the cost out of tax dollars.

Another type of transportation service might be able to operate at lower cost and survive quite adequately on the same revenue levels which the first bus company finds inadequate. The flexibility to change from an unsatisfactory, uneconomic system of transport, to a more economic system, is therefore a key element in the development of better transportation and transportation laws.

The operation and administration of the transportation entity assumes some structures such as an ordinary public corporation

or a government operated administrative board. Following the principle that the shortest and easiest route must also be the best one for the society and its economic goals, then the creative legislation and the regulatory laws must allow for the cost of all capital and the payment of a satisfactory level of dividends or else the organizational structure will become a direct financial burden as a charge on tax-raised funds.

IV. *Outlook for Surface Transportation.*

Transportation can be viewed as a commodity used by many diverse elements of society, all types of businesses, and by people in all geographic areas. It is one in which there are great conflicts of direction and purpose. Following the guidelines of the 1967 National Transportation Act,¹ these aims are best achieved through effective competition and the application of natural economic forces. The greatest development of transportation in Canada has occurred during periods of minimum regulation and restraint. As a rule, by present custom, some restraint would have been imposed in the purely monopolistic segments of the first railways, the first canals and the first roads. There is no longer the absence of competition or substitutability needed for effective natural regulation of these industries.

In the long range, however, the development of transport systems will see a return to complete monopolies of the specialized transportation conveyors, pipelines, "horizontal elevator" type of devices, such that new concepts for organization and regulation will again have to be invented. We claim that it is possible to foresee the technical developments, construction, markets and growth of transportation systems. Synthesizing the administrative structures and regulatory laws under which these systems will operate is a projection even one step further removed from the insight into the future which we are groping with now and necessarily one step more obscure. As new legislation is evolved to deal with these new systems the principle of providing an inherent capability of self-optimization of each of the services will be essential to avoid the straight-jacket that some segments of the transportation industry in the United States find themselves in today.

The evolution of Canadian transportation has been orderly, logical and consistent with the aims of Canadian society, government policy and the comfort and convenience of the population. What will be required to hold and maintain this advantage in the future is the ability to take an intelligent, objective perspective of Canadian transportation—a formidable task indeed. It will periodically be necessary to clean out and "repaint and redecorate" the

¹ R.S.C., 1970, c. N-17.

regulatory housekeeping chore every twenty years or so and to maintain simplicity as an overriding policy above all else.

With these objectives, adjustments to the future can be relatively painless and will in themselves become a hallmark of Canadian transportation legislation. In a country in which transportation represents a larger proportion of gross national product than it does in any other country in the world, it is to be hoped that the efficiency, effectiveness and creativity of transportation legislation in Canada will keep pace with the need and development of these new systems which are now visible on the horizon.
