"50 Years of Transportation Education -- Then, Now and Next"

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ABSTRACT

The origin of this paper was to reflect on the changes that university transport education has undergone over the last fifty years since the UBC Faculty of Commerce and Business Administration (now the Sauder School of Business) was established in 1956. Its Bachelor of Commerce degree program has enabled students to specialize in transport and related subjects since that time. This paper reflects on the changes that have taken place in the transport and logistics industries, and how North American university transport programs and some individual courses have changed as well. In 1956, transport was rail-dominated and each mode was regarded as a separate entity with its own unique problems but subject to extensive government controls. The word "logistics" was an arcane military term. How times have changed. The changes in industry, markets and education are summarized emphasizing the links between economics, management and public policy issues with transport education. We conclude by considering prospective developments.

Introduction: Motivation and Purpose

The UBC B.Com. specialization in transport was unique in Canada but some universities in the United States had transport programs;[2]

several universities had one or two elective courses in the area. We review the UBC business program in transport as reflective of similar business school transport programs elsewhere. Many universities had transport courses based in engineering or planning. Although there are overlaps and common interests in some economic and policy issues, the characteristics of these the programs are not dealt with.

Our motivation is to review the changing features of the transport industry and the nature of education programs. We begin with some reminders about how different the economy and transport systems were 50 years ago. We then outline the types and emphasis of courses from that era. Next we review the significant changes that took place in transport and transport education over the subsequent decades. We do not suggest precise dates as break points but divide our treatment into four periods. We conclude by speculating about transport and logistics education in the future.

Transportation and the Economy circa 1950s

It is easy to forget how different the economy and transport industry was 50 years ago so here are a few facts from 1956:[3]
Canadian GNP was approaching $30 billion and the population was 16 million. Louis St Laurent was Prime Minister. In the six-team NHL, Montreal (with Maurice Richard, Jean Beliveau, 'Boom Boom' Geoffrion, Doug Harvey) defeated Detroit for first of five consecutive Stanley Cups. In the cultural world, "rock and roll" was just emerging. Only 12 percent of Canadian households had TVs. *I Love Lucy* was the number one TV show in the U.S.; Saturday night hockey was among the top in Canada (well, not everything has changed since 1956). One third of households had no telephone, and the first trans-Atlantic telephone cable opened in 1956.

In transport, the railways were still the dominant mode both for freight and intercity commercial passenger travel. Almost two-thirds of Canadian locomotives were still steam powered although being replaced rapidly. The trucking industry was emerging, especially in Ontario and Quebec but there was no national highway across Canada, we used U.S. routes. The U.S. was talking about building an Interstate highway system. Most oil and petroleum products were

moved by rail; 1956 saw controversy in Parliament over a decision to help build a gas pipeline from Alberta to Winnipeg. The St. Lawrence Seaway was under construction. Trans-Canada Airlines' (later Air Canada) fleet was 9 Super Constellations, 18 Viscounts, 21 North Stars and 24 DC-3s. Commercial jets were still two years away. A new Chevrolet or Ford (Meteor) was about $2000. Gasoline was about 25 cents per gallon. Foreign cars were English; in 1955 and 1956 combined, only one Japanese car was imported into Canada!

Transport (primarily meaning railways) was recognized as a key sector of the Canadian economy, because of the extent of our geography and the importance of our resource sector. The developing manufacturing base was still reliant on railways although trucking was playing an increasingly important role.

Much of the transport (read railway) industry was still perceived as monopolistic. In both the U.S. and Canada, there was a decades old conviction that railways (and public utilities) were "…businesses affected with the public interest," and had to be regulated because market competition would not work. Competition associated with trucking was seen as "destructive competition." Although the role of provinces in the regulation of trucking meant less rigid regulation of this mode in Canada than in the U.S., an elaborate transport regulatory structure prevailed in both countries. Canada differed from the U.S. in having some federal government ownership, including airports, ports, Trans-Canada Airlines and Canadian National Railways, although the latter two operated somewhat at 'arms length' from the government.

Transport Education of the 1950s

University transport courses reflected the institutional environment and structure of the industry. The necessity of regulation and reviews of landmark regulations and court decisions were an important component of courses. The emphasis was on rail transport as reflected in A.W. Currie's *Economics of Canadian Transportation.* Courses on public utilities were common because of the management and regulatory issues raised by these capital intensive industries.[4]

Transport courses typically included the development of the modes, the nature of their operations and their economic characteristics, the theory and practice of rate making and the regulation of rates. An emphasis was placed on rate structures and the principles, practices and issues associated with value of service pricing. Description of the regulatory institutions and procedures, and examination of regulations and landmark cases were included. A course on traffic management was an important part of programs. Knowledge of freight classification and rate tariffs was important. Job prospects for graduates were excellent.

Exhibit 1 is a schematic of specialized courses in transport programs in the late 1950s.[5] Students would have had other required and elective courses as a part of the business program. Many universities would have only one or two elective courses that might combine some of the subjects in the Exhibit.

Exhibit 1: Types of Transport Courses, 1950s

Public Utilities: The development, economics, rate-making and regulations of high fixed cost network industries such as electric power, telephone, water supply and railroads.

Transportation Economics: Development of the modes, emphasis on rail transportation; cost characteristics; pricing theory and rail rate structures; transport regulations; location of industry.

Traffic Management: Characteristics of modal services; freight classification and rate structures; documentation and regulations; packaging and warehousing.

At UBC, augmented by modal courses on **Air Transportation**, **Motor/Highway Transportation**, and **Water Transportation.** With a five-year program, UBC also required a **Graduating Essay**.

Changes in Transport and Transport Education: 1960s/70s

The 1960s and 1970s witnessed continuing significant change in the transport industry and perceptions about the nature of regulation needed. The industry changes were the accumulative effects of technological change in all modes of transport and the growth of markets both from population increase and rising standards of living. Concurrently, new attitudes emerged about the role of markets in the economy generally.

Competition in transport markets led to new methods in carrier management and to new public policies. Canada was a leader in the early stages. R.A. Bandeen and John Stenason, directors of research at CN and CPR respectively, both had doctoral degrees in economics. They reflected the growing presence of economists in business.[6] Stenason was a co-author in the landmark book Meyer et al. (1959): *The economics of competition in the transportation industries.*[7] This book set the standard for and orientation of transport economics courses for a couple of decades. Analysis of the structure and cost characteristics of the transport industry supported a case for greater reliance on markets to determine resource allocation in transport. The arguments of some before the MacPherson Royal Commission on Transportation, for example Dr. W. Hughes of UBC for the Province of BC, and the report of the Commission, influenced greatly by its Research Director, F.W. Anderson of the University of Saskatchewan, reflected the changing environment. In 1967, Canada adopted a new policy and substantial deregulation for railway pricing in the *National Transportation Act*, well ahead of deregulation in the U.S.[8]

Except for the Canadian rail pricing freedom example, the concept of relying on market competition in transport was primarily an academic idea. It was prominent in university research papers and courses for over a decade before interest grew in industry and government. Reducing government controls and relying on market competition did not capture major political attention in the U.S. until the mid 1970s. Air deregulation came first but was followed by other modes. The Canadian experience with rail pricing freedom was an influential factor in U.S. rail deregulation. The election of Mrs. Thatcher in 1979 and Ronald Reagan in 1981 ushered in a period of rapid change.

The changing environment meant substantial changes in course content. Strategies for carriers and shippers in the negotiation of rates became paramount beyond knowledge of types of rates. The economic analysis of transport cost conditions, markets, and regulatory performance were major themes in transport economics courses. But the significant change for students was the importance of

logistics. The growth of trucking resulted in new competitive pressures on the railways. Shippers were faced with new higher-cost quicker-service alternatives to rail transport which made cost analysis and rate assessment more important parts of traffic management courses. But it was the growth of air cargo potential that made total cost analysis even more important for physical distribution management. The assessment of *higher* cost air transport could only be made by examining its cost implications for inventory and related distribution costs. Textbooks changed from those on traffic management to those on physical distribution management and then to business logistics. At UBC, "Traffic Management" became "Business Logistics" in 1963.

Employment prospects for students expanded. Gradually logistics jobs became more common than those in carriers. Governments and consulting firms sought transportation expertise and these employment opportunities increased in the 1970s. Heightened interest in transport and related programs supported new faculty and more resources at universities, enabling growth and change in the orientation of university courses. Transport Canada support for university programs evolved in the 1970s.

Another change in course coverage reflected the fading identification of railways with public utilities. At UBC, the course on public utilities was reduced from two terms to one, and then gave way to a course on public policy in transport and public utilities with an increasing emphasis on the former. The involvement of public investment in transport in highways, ports and airports, resulted in transport programs needing to deal with matters of project appraisal using cost-benefit analysis, a topic also of interest to students in engineering and planning. Some business transport programs, including UBC, introduced a course in urban transport, not for training students for employment, but as an important 'context' course. It made students more aware of externalities and consequent inefficiencies in market outcomes and the governance problems in trying to deal with them. The evolution of undergraduate courses into the 1970s is indicated in Exhibit 2.

The 1960s and 1970s witnessed growth in graduate programs in transport and logistics. UBC had three graduate courses in transport from 1963 and added a logistics course in 1973. The emergence of transport courses particularly at the graduate level was encouraged and facilitated by the Transport University Program of Transport Canada from 1970.

Exhibit 2: Evolution of Transport Courses in the 1960s and 1970s

Transportation Economics: Focus on production, cost characteristics (fixed, sunk, joint and common costs), and pricing theory, contrasting rail with other modes; empirical analyses.

Public Policy in Transport and Public Utilities: Problems of government owned and regulated businesses; critical examination of regulatory performance, possible greater reliance on markets.

Transport Infrastructure Evaluation: The effects of transport investments; methods of project appraisal including social cost-benefit analysis.

Transport Management: General issues in the management of transport companies; cost analysis, demand and traffic forecasts, fleet planning, scheduling, marketing and pricing.

Business Logistics: Managing carrier relations including rate negotiation; integrating transport with inbound and outbound material flows; warehouse location; inventory control and linear programming.

At UBC, specialized elective courses on **Air Transportation** and **Water Transportation** continued. **Urban Transportation** was added dealing more with economic issues and externalities in urban passenger transportation.

Transport and Transport Education: 1980 to mid-1990s

The deregulation movement was well underway by the early 1980s. The political forces that brought this about also led to a more general push for reducing the size of government. This was a period of government deficits and inflation, followed by a recession. Getting government spending under control was accompanied by the substantial downsizing of government activities in transport, including privatization and devolution of infrastructure, planning and finance to regional or local authorities. The Transport Canada universities program ended in the mid 1980s. The 'Crow rate' reforms came about in the 1980s, and the subsidy eliminated in the

early 1990s. A concern about inadequate infrastructure investment persisted through this period. There were still public policy issues, including new approaches to regulation such as price-cap models and access regimes, but these issues were fewer than in previous years. Transport was becoming like any other business.

Increased competition affected shippers as well as carriers. The immediate effect of transport competition and confidential contract rates was to heighten the importance of transport and logistics decisions in corporate strategy. The use of outsourcing in pursuit of efficiencies was prominent in logistics and led to the evolution of a logistics industry from old freight forwarders and new services of carriers. The importance of logistics gained wider recognition in corporations and in academia. It was evident in firms by the increase in the number of corporate vice-presidents of logistics, and in universities by the number of logistics courses and the growing enrolment in them. It was associated with a greater interest among employers for students with a Masters degree. However, during this period universities faced fiscal constraints that affected the size and scope of programs. Student employment prospects were affected by recession periods, carriers and governments were down-sizing but logistics jobs were the best prospects for students.

Exhibit 3 shows the combined effects of these conditions at UBC. The Faculty reduced the length of its programs to four years, reducing the level of specialization possible. The increased importance of logistics and the increased importance of global sourcing are reflected in the shipping course explicitly adopting a logistics orientation. Transport economics becomes a recommended elective, not a requirement. Urban transport and project appraisal were combined.

Exhibit 3: Types of Transport Courses in the early 1990s, UBC

Business Logistics: Basic course was followed by a senior course with greater emphasis on analytic techniques and strategy.

Carrier Management: Also treated in two courses, making it possible for non-majors to gain some exposure.

Government and Business: A special section for transport and logistics majors of a generally required course gives some exposure to transport policy matters.

Urban Transport and Project Appraisal: public investment in urban infrastructure was used as a means to combine these two topics.
Specialized elective courses: **Air Transport**; **Shipping and International Logistics**; and **Transport Economics**.

Transport and Transport Education: mid-1990s to 2007

Continued advances in information technologies and systems enabled further integration in logistics to support global supply chains. Global sophisticated patterns of outsourcing and logistics service have evolved. They reflect the value and demand variability of specific commodities. Transport and logistics companies have improved their services and efficiencies greatly to enable and serve economic growth. The record fully reflects the efficiency of the market system.

However, the rapid growth of trade, particularly with China, revealed capacity limitations, especially in ports and their inland connections. Urban traffic congestion was aggravated and the challenges of railways to meet peak demands became evident. Challenges in achieving desired levels of integration across the whole logistics system were revealed. Issues about public and private roles in the provision of transport infrastructure have arisen; how can the private sector participate in road investment and the public assist in railway investment? On the open roads, should some form of congestion pricing be implemented as it has in other countries? As railways achieve better rates of return on capital and face high levels of capacity utilization some questions even arise about how the incentives of the railways and the regulations that they face affect levels of investment in capacity. What are optimum levels of investment and are they likely to be achieved? Given the special nature of transport, public policy questions still arise. Finally, the environmental effects of transport attracts heightened attention as concern about air emissions is added to the more local congestion, noise and aesthetic concerns.

But despite the substantial number of public policy issues, transport and logistics programs have tended to focus on the market demand for graduates emphasizing logistics and the broader context of supply chain management (SCM). The relevance of logistics to the design

and operation of supply chains, often global in extent, has heightened the position of logistics courses in business programs and given rise to courses and programs on SCM. The logistics courses are now more effectively integrated with other business specializations. The number of purely transportation courses has decreased significantly. The first Carrier Management course at UBC has now become a course of Logistics Services Management to reflect the design and management of the full range of services including transport.

A corollary to these changes is that transport economics and policy has a smaller role in programs despite the continued importance of public policy issues. Concerns about competition, congestion and the provision of infrastructure remain prominent. Environmental issues are rising in importance.

Exhibit 4 lists the UBC courses in the undergraduate Transport and Logistics program (TLOG) for the academic year 2006/2007. The MBA program offers a specialization in SCM, requiring 8 out of 20 modules in SCM-related courses, to complement the strong broad management education that the MBA is designed to provide.

Exhibit 4: Current UBC Undergraduate Transport Courses

Logistics and Operations Management: The design and management of systems to make products and to provide services and deliver them to the end user.

Logistics Services Management: Overview of the characteristics and commercial environment of logistics and transportation services; service operations planning and design, costing, pricing and quality management.

Government and Business: Roles of government and business in the Canadian economy including effects of public policy on the business environment. Ethical foundations of government, business and personal decision-making. A section exists for TLOG majors.

Advanced Business Logistics: Analysis of logistics systems within firms and across supply chains. The formulation of corporate logistics strategies.

Supply-Chain Management: Integrated management of production and logistics systems; management of inter-organizations relationships in the supply chain, including vendor selection, bidding

and negotiation processes, partnering and performance measurement.
Specialized elective courses: **E-Business and Supply Chain Management**; **Air Transport**; **Shipping and International Logistics**; **Project Appraisal and Management**; and **Transport Economics**.

What's Next for Transport and Logistics Education?

The shift in orientation at UBC, as at programs elsewhere, has been a greater emphasis on management tools in logistics and SCM, and less attention to issues and methods taught in transport economics and policy courses. Partly this reflects the shift away from transport regulation and public ownership. Primarily it is the dominance of employment opportunities in logistics and SCM. However, policy questions with important economic dimensions remain.

We have reflected on past trends and changes in the transport sector and university education. From this we hazard suggestions about directions that may emerge. Are there themes or issues that are emerging now, a drift of events or ideas that will change how we view and manage transport and logistics? We suggest three: globalization; infrastructure finance with related issues of capacity utilization and inter-carrier operations integration; and environmental costs. We explore these and consider how they might affect transport and logistics education.

We have two starting observations. First, we note that change is a gradual process. Reforming transport into a more market-driven and responsive industry took a couple decades. Some might argue that we are not fully there yet! Second, we suspect that the extent of change is likely to be greater than we expect; who would have foreseen the effectiveness of competition in most transport markets or the efficiency to be achieved by a privatized CN?

Globalization: Globalization is an existing phenomenon, yet it is not clear that its implications are felt fully. After all, it is relatively new and the world is still a very fragmented place by political and economic trade barriers. Air transport is a good example. However, the number of companies with the size, vision and power to

implement global strategies is increasing. An example is the approach of Maersk to its ocean cargo imbalances. They reconfigure not just their shipping routes but shipping along with their intra-continental logistics network. A different scale of thinking is required than simply running a shipping business. It is significant that Maersk recruits annually on an international basis into its global management training program. Universities need to cooperate with global logistics companies in the education and placement of students. Universities already encourage international exchanges for students but more needs to be achieved to prepare them for the challenges and opportunities of an ever more global business environment.

Infrastructure Finance: We believe that the provision of infrastructure will become a more important issue. There have been laments for a couple of decades that public infrastructure investments have not kept pace with increased traffic. There appear to be two main constraints. First, governments are reluctant to allocate funds for infrastructure because they are hard pressed for funding of health, education and other social programs. Second, the needs for capacity expansion come from diverse conditions and trade-offs among diverse interested parties. These are difficult circumstances for politicians. At the same time, governments are reluctant to introduce new funding mechanisms.

Capacity planning and utilization are old problems. They arise as heightened problems because of traffic growth and the greater interdependency of the transport and logistics systems in high service logistics systems. Hence, we speculate on a possible new emphasis to include in university courses on transport and logistics. It is appropriate to explore more fully alternate approaches to the provision and funding of transport infrastructure. CTAR raised the concept of new institutions with greater involvement by transport users in financing and investing in infrastructure, such as road management funds, as is done for airports, the St Lawrence Seaway and air navigation services. Even controversial fees such as congestion charges might be more palatable if they are part of infrastructure finance in response to user preferences.

The need for and acceptability of investment in new infrastructure is related to the efficiency with which the existing system is used. Two current problems stand out. The first of these relates to the use of the existing system. The study of *capacity utilization* needs to be conducted and thought about in business and in university courses in a much broader context than is usual today. The bottlenecks in container logistics in 2005 demonstrated the importance of better long-run and short-run information exchange in a supply chain, greater and wider planning for peak logistics needs processes by which trade offs are made among alternate strategies, including different distributions of responsibilities.

The second area for improved performance is inter-carrier operations integration. The need for effective integration of transport between modes and carriers is nothing new. However, its importance has been heightened by the increasingly global nature of supply chains and the greater cost and service efficiency required of logistics systems. The scale of integration required in terms of the number of carriers involved, the volume of traffic and the efficiency required of the systems give new dimensions to old problems.

The problems are widely evident in the interface of inland carriers with container terminals. Issues that affect integration include the assumption or not of responsibility for integration of operations by a single party, the regulatory regime affecting services, information systems and pricing practices among the various operators. Currently, the economic and management principles related to integration do not get the attention needed by firms or educators. They fit well into a SCM context but they go beyond the usual partner relationship between a seller and buyer.

Environment: In 2007, it is evident that some fundamental rethinking is required about transport and the environment. The most important externalities of transport are congestion and emissions. Do or will transport and logistics courses impart to students a new ethos that includes environmental costs in decisions? More broadly and more basically, the focus could be on identifying institutional changes and mechanisms that will bring this about. There are two steps. The

first is recognizing and accepting environmental costs as a legitimate cost to be included and the second is finding ways they can be taken into account. Students, whatever their interest in transport, need to have thought about these matters.

Recognizing environmental costs is a logical progression in our long-standing recognition and commitment to "…making the best use of modes at lowest total costs." The principle of recognizing environmental costs is becoming more widely recognized, but this is a long way from adoption in practice. A new wave of interest and concern for the environment will have to be translated into its implications for SCM. A 'green' SCM would look at the implications of alternate ways of modifying current SCM procedures to have varying impact greenhouse gas emissions and other externalities. A specific example might be examining how tradeable permits for emissions would be integrated into supply chain design and management. A greener SCM will not happen without new attitudes and appropriate regulations and incentives.

Many in the environmental movement seem to have great confidence in the ability of governments to make wise decisions about regulations and investments. The experience in transport might suggest otherwise. The high performance of modern transport systems and supply chains came about with much less government intervention than in the past. But environmental problems require government intervention because of externalities. We will need more efficient and effective government policies than in the past. The design of policies and institutional structures will be vital if we are to maintain high-performing supply chains but also reconcile them with environmental concerns. This is an important agenda for university research and teaching programs in transport and logistics.

Concluding Remarks. The evolution of transport and logistics systems into modern highly-efficient global supply chains is a remarkable achievement of the late 20th century. They are vital to our modern way of life. University programs in transport or SCM programs are well attended. We speculate that supplementing such programs with these three broader challenges will better prepare

graduates for the challenges of making even better decisions and more efficient systems in the future.

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[1] The authors were Faculty members at UBC from 1960 and 1970 respectively.

[2] The leading U.S. university business school transport programs included Michigan State, Pennsylvania State, Northwestern, Wisconsin and Indiana University.

[3] This section draws heavily from Chapter 1 in Freeman, et al., The growth and performance of the Canadian transcontinental railways, 1956-1981 (Vancouver: UBC Centre for Transportation Studies (1987).

[4] Courses on (rail) transportation and public utilities were common subjects in Economics departments through the 1930s and 1940s (including at UBC). As Economics Departments increasingly emphasized theory and methodological courses, transport and utilities were picked up in the newly-forming Schools of Business.

[5] The UBC program is used as the basis for the exhibits, but in most cases it is representative of courses and emphasis in transport and logistics programs that existed at other major university schools of business.

[6] The following article gives an interesting perspective on the evolving role of business economists in firms and the community during the 1950s and 1960s. David Braide and John Parish, "Moneco Econtro: Origins and Development", *Canadian Business Economics*, Winter/Spring 1997, pp. 121-128. Located at http://www.cabe.ca/cbe/vol5_2_3/52-11bra.pdf February 22 2007.

[7] John R Meyer, M.J.Peck, J. Stenason, C.Zwick *The economics of competition in the transportation industries* (Cambridge, MA: Harvard University Press) 1959.

[8] Harry Purdy published *Transport competition and public policy in Canada* (Vancouver: UBC Press) in 1972.