INDIAN INSTITUTE OF MANAGEMENT CALCUTTA

WORKING PAPER SERIES

WPS No. 679/ September 2011

Determinants of profitability of US Class I Freight Railroads

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Abstract

US Class I railroads have been operating profitably and carrying substantial market share of traffic, in spite of the inherent disadvantages of rail transport as well as highly developed road, water and air transport infrastructure. This paper examines the key initiatives that railroads have taken to reach this stage, as well as the factors which have enabled them to successfully deploy these initiatives. The paper then discusses the implications of these measures in terms of long term growth of the railroads and for the society.

Keywords: rail transport,railroads, freight, technology, USA

1.Introduction

US railroads play a dominant role in the economy of the United States of America. The US freight-rail system carries 16 percent of the nation's freight by tonnage, accounting for 28 percent of total ton-miles, 40 percent of intercity ton-miles, and six percent of freight value. (American Association of State Highway and Transportation Officials, 2009) About 70 percent of domestically produced automobiles, 70 percent of coal delivered to power plants and 35 percent of the grain harvest moves by rail in the US. (Laurits R.Christensen Associates Inc., 2009)

US railroads have to compete with well developed alternate modes of transport operating on one the world's best logistics infrastructures. There are about 98 air carriers, 680 thousand inter-state motor carriers, 680 marine vessel operators and 2300 pipeline operators using about 4 million miles of highways (of which 47,000 miles are Interstate Highways), 13 thousand miles of navigable waterways (including the Great Lakes- St.Lawrence Seaway), 20 thousand civilian airports, 167 thousand miles of oil pipelines and 1.5 million miles of gas pipelines in 2007.

Again none of the US freight railroads are government owned. On the other hand US railroads are subject to regulation by various agencies such as the Federal Railroad Administration and the Surface Transportation Board on a number of aspects, such as permission to construct or operate a railroad network, abandon or discontinue operations. While railroads around the world flounder in face of competition from other modes of transport, US railroads operate profitably without government subsidies- a good indication of which is the operating ratio given by ratio of operating expenses to operating revenues. The operating ratio of US railroads varies from 0.71 to 0.73, in comparison to 0.87 for Russian Railways and 0.95 for Indian Railways for the period 2010-11.

Of particular interest are the US Class I railroads which account for 70 percent of the railroad industry's mileage operated, 89 percent of its employees, 84 percent of originating traffic and 92 percent of its freight revenue. Class I railroads are those with annual operating revenues of $319.3 million or more as of 2005 (amount is adjusted annually for inflation and must be reached or

exceeded for three consecutive years for a firm to be considered Class I) as per STB guidelines. The class I railroads are the Burlington Northern/Santa Fe(BNSF); the Canadian National-CN (which controls the merged Grand Trunk Western and Illinois Central); Canadian Pacific-CP (which controls the Soo Line); CSX Transportation; Kansas City Southern Railway; Norfolk Southern(NS); and the Union Pacific(UP).

There has been little research on the factors that have enabled the US Class I railroads to evolve to a profitable operating industry in competition with a developed and efficient trucking industry. This paper examines the various operational aspects of the US railroads, the regulation mechanism and the industry structure to determine these factors. This paper is organized as follows: the unique features of the railroad industry are elaborated in Section 2 followed by a discussion on the key profit enhancing initiatives adopted by US railroads in Section 3, the enabling environmental factors in Section 4, implications of initiatives and enablers in Section 5, followed by conclusions in Section 6.

2. Unique Features of the railroad industry

The railway industry primarily consists of a network of railway lines, on which freight or passenger cars are hauled by locomotives. Each line comprises a pair of tracks which are spread at a certain distance apart; the distance between the inner sides of the heads of the two tracks is known as the gauge of the railway line. There are a number of gauges used throughout the world such as standard gauge of 1435 mm (used in 60% of the world's railways mainly in Europe, United States, Canada, China, North and South Korea, Australia, Middle East, North Africa, Mexico, Cuba, Panama, Venezuela, Peru, Uruguay, Philippines, and high speed lines of Japan and Spain), the Indian gauge of 1676 mm (used in 7% of the world's railways mainly in Indian subcontinent, Argentine and Chile), the Iberian gauge of 1668 mm (used in Portugal and Spain), the Irish gauge of 1600 mm(used in Ireland, Australia and Brazil), the Russian gauge of 1524 mm(used in 17% of world's railways mainly in the CIS states and Mongolia), the Cape gauge of 1067 mm (used in 9% of the world's railways mainly in southern and central Africa, Indonesia, Japan, Taiwan, Philippines, New Zealand and Queensland Australi

Since trains have a very large mass and run on low friction wheel-rail interface, the distance

intermediate work. But shippers do not always require shipments as full train loads and might require shipments in only 2 to 3 cars. Further each shipper might have a different origin and a different destination. Say a shipper 1 wishes to send 50 car loads from P to Q, the route of which traverses through X and Y; similarly, say another shipper 2 wishes to send 50 car loads from R to S, the route of which also traverses through X and Y. Since the railroad would wish to maximize its track utilization, by running trains of maximum capacity, the railroad will take the following steps: first, send shipper 1's 50 car loads as a train from P to X and send shipper 2's 50 car loads as a train from R to X; second, form a single train with shipper 1's 50 car loads and shipper 2's 50 car loads and run it from X to Y; third, on arrival of the train at Y, the train is broken up into two trains one comprising shipper 1's 50 car loads (which is sent to Q) and the other comprising shipper 2's 50 car loads (which is sent to S). A terminal yard will however be required at X and Y for forming and breaking up the train. Such terminal yards usually comprising three separate yards: first, the reception yard, where trains arrive for re-configuration; second the classification yard, where the sorting, breaking and forming of trains are done a

are two adjoining districts D1 and D2 with rest station located at the boundary of D1 and D2, D1 crew will operate from a train from their base station to the rest station where after the D2 crew will operate the train till their base station. Trains are thus consecutively handled by crews of different districts on its route.

Rail capacity (or the maximum flow through the railroad network) is affected by the following factors: number of tracks, number and length of loops, number of crossovers and other connections, type of signaling, speed limits, grades and curvature, availability of freight cars and locomotives, overhead clearances for movement of double-stack containers, traffic mix and terminal facilities. (Battelle, 2010) Other factors affecting capacity are operating strategies (e.g., size, speed, and timing of trains), motive power and freight car capacities, reliability of infrastructure and equipment, and extent of redundancy of infrastructure and equipment.

3. Keys to profitability of US Class I Freight Railroads

Railroads require enormous investments in the track and rolling stock (locomotives and cars are termed as rolling stock in railroad parlance). Since these investments are sunk costs, railroads have two options in remaining profitable: control costs and augment revenues. Railroads have also revamped their organization structure to facilitate better customer orientation and service.

3.1 Cost Control measures

US Class I freight railroads have adopted various cost control measures which are discussed below. It will be observed that many of these measures could be adopted in the US, since unique situations exist in the US business and regulation environment.

3.1.1 Concept of core owned network

Owning a network implies incurring regular cost of maintaining the network and its associated assets such as signals and switches. US Class I railroads have thus taken measures over the last three decades to identify and strengthen a core network, which promises to have high volume and profitable traffic. Simultaneously other parts of the network have been abandoned, thus relieving the railroad the liability of maintenance. Abandonment has largely occurred in the north-central agricultural states (which did not require dense networks after advent of trucks and paved roads in the late 1920s), few competitively over served routes (such as Chicago to Omaha), relatively heavily settled areas with good trucking services (such as Illinois, Indiana and Ohio) and mines having exhausted reserves (such as iron ore mines of Michigan and Minnesota). Abandonment also has occurred as a result of mergers and consolidations among railroads, which led to duplicative or redundant lines. The Class I railroad system today has less than half the number of miles it had in the 1920s. (Cramer, 2007)

Further railroads have agreements amongst themselves which allow other railroads to utilize their networks. These agreements take many forms: (a) Where two railroads each own only one single line between points A and B, the two railroads could agree amongst themselves to both use one of the lines for movement only from A to B and the other line for movement only from B to A. Movement in both directions on a single line can cause delays due to crossings that have to be arranged for traffic moving in opposite directions. On the other hand, movement in a single

direction causes no such delays since trains are simply following each other in the same direction; this is especially evident if most of the traffic is flowing at the same speed. A variation of this arrangement is the formation of a joint company solely for maintenance and operation of the network between points A and B. (b) Railroads could agree to pay charges to use others' railroad tracks. Railroads could use their own locomotives and crew for hauling traffic on others' railroad tracks or could pay for use of track owning railroad's locomotives and crew for hauling traffic. This arrangement affords the railroad customers to ship goods from or to points beyond the railroad's network while ensuring maximum utilization of the track capacity. Railroads also have arrangements to use others' railroad tracks to provide alternate routing of traffic in event of incapacitation of portions of their own network owing to accidents or natural calamities.

This concept of core networks has been facilitated by the 1980 Staggers Act, where the Surface Transportation Board (STB) can allow railroads to abandon or discontinue operations over any part of its network. Further the STB guidelines make it mandatory to railroads to provide its facilities to other railroads, wherever feasible.

Regional and short-line systems have been formed mostly through networks abandoned by the Class I railroads. The regional and short-line systems differ from Class I railroads through less stringent labor cost structures (being subject to relaxed labor rules and flexible salaries compared to Class I railroads), less stringent government requirements for track and equinetworks aban

Association of American Railroads (AAR). While this arrangement has spared the railroads in incurring capital expenses for development of such complementary industries, it has also ensured development of specialized expertise in these industries.

3.1.3 Reduced maintenance load

Railroads have reduced maintena

assumed management of Canadian Pacific Railway's Ogden equipment overhaul and repair shops in Calgary, Alberta. (Strategic Innovations in North American Railroad Management, 2005)

3.1.5 Inter-railroad Coordinating and Pooling

Railroads have coordinated amongst themselves in pooling resources through various agencies such as TTX or the Association of American Railroads (AAR).

Average train lengths for auto trains are 64 to 57

Over the past decade, railroads have introduced scheduled intermodal services with guaranteed reliability (e.g., within 1.0 hours of schedule, 99 percent of the time). This method of operation entails running trains of specific configurations between a particular origin-destination pair according to a pre-determined schedule. The benefits for the road partner is that the hauling time by railroad is consistent, allowing the roadways to guarantee a level of service to its own customer. The benefit for the rail partner is that uncertain

highest in the world; US at 1439 km for US Class 1 railroads compared to 1520 km for Canadian Pacific, 1450 km in the Russian Federation, 1362 km for Brazil's BR Ferronorte, 1235 km for Canadian National, 1210 km for Mexico, 838 km in China, 831 km for Brazil's BR EFC Carajas, and 661 km for India. (United Nations Conference on Trade & Development, 2010). Typical examples of these long distance movements are the movement of coal from Powder River Basin of Wyoming to South and Northeast US and the container traffic from Californian seaports to Texas and St.Louis markets. As mentioned earlier, since freight haul becomes more economical on rail for distances above 500 miles (Cramer, 2007), US railroads gain significant advantage over road transport for very long distance traffic.

The fifth factor favoring the US railroads is the prevalence of a few very high density traffic routes. A major reason for few high density routes in the US is extent of urbanization; about 81.4% of population resides in urban agglomerations in the US (United Nations Department of Economic & Social Affairs Population Division). Only 36 largest cities in the US make up 39.5% of the US population; in contrast 43 largest cities in India make up only 12.1 % of the Indian population. The high concentration of population in certain urban agglomerations translates into major traffic destinations, due to demand in those locations. An example of this is the transportation demand associated with the thermal electricity production industry. Analysis of distribution of electricity power generation capacities shows that 48% of installed power generation is located in only the ten states of Texas, California, Alabama, Georgia, Florida, Illinois, Michigan, Ohio, Pennsylvania and New York. (U.S. Energy Information Administration, December 2010) Thus there are very high density routes from the coal fields of Powder River Basin to these states. Thus while 74% of coal originated from the three states of Wyoming (52.2%), West Virginia(13.2%) and Kentucky(9.2%), 58% of the coal terminated in these ten states of Illinois, Texas, Missouri, Virginia, Wisconsin, Ohio, Georgia, Pennsylvania, Indiana and North Carolina.

5. Implications

Class I railroads have leveraged the enablers to evolve to the present industry structg Tc.18i5.3(g[(tions 3N5]TJ2(