

Train as an innovation of the transport industry economics essay



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This report will explore the train as an innovation with the market structure of the transport industry being examined; taking into account the factors associated with innovation. Competition prior to the introduction of the train and the nature of that which exists between companies within the industry now will be analysed. Since the initial innovation of the steam train; there have been many developments leading to the most recent innovation, the bullet train. This report focuses on the developments of the steam locomotive, created by Trevithick then the following entrants to the market, Stevenson and Brunel, highlighting the major impacts on the transport industry and how these have changed and influenced trains up to the present day.

Innovation, Prior Competition and Initial Market Entrants

Before the train the main form of transport across the country was by horse and cart or canals. The train had an era of dominance from the early 19th century until the late 1930's with approximately 30, 842 kilometres of railway having been built during this period (Lowson, 1998). Trains formed the basis of development during Victorian times with both industrial and business opportunities. They allowed society to develop both significantly and on a large scale. Towns and cities were connected overnight, resulting in rapid growth of these areas; however, those towns without connections became backwaters and developed at a much slower rate (Lowson, 1998).

The first train to be run on a railway was designed by Trevithick, this first steam locomotive ran on iron rails in 1804 from Penydarren to Abercynon but it was left there to act as a stationary engine; his reason for this is unknown, however, it has been suggested that he lost interest (Lowson, <https://assignbuster.com/train-as-an-innovation-of-the-transport-industry-economics-essay/>)

1998). Early trains ran on a plate track which was also used by wagons. By the 1820's locomotive technology was not advanced and reliable enough for passenger transport and horses were still used to

pull the wagons; however, the complete utilisation of the train came with the invention of rolled wrought iron rails, invented and implemented by John Birkinshaw in 1820 (Lowson, 1998). It could be said that that technological development of iron ore was required for the next stage of the innovation to happen (Churella, 1998).

The first passenger train service was the Oystermouth Railway in Swansea in 1807 though it was originally designed to transport minerals and was built under an Act of Parliament of 1804 (Lee, 1988). The Stockton and Darlington Railway was the first publicly subscribed railway, carrying only freight and was opened in 1825 and passengers were sometimes transported by wagons as steam trains were not seen as safe (Lowton, 1998). Preceding this in 1830, the Liverpool to Manchester railway opened, using the Stephenson' Rocket and was the first railway to rely on steam only and the funding for the line was dependant on earnings from the carriage of passengers (Lowson, 1998). The Stephenson locomotive was the first steam train to combine several innovations and has become the template for most steam trains (Bailey and Glithero, 2002).

In 1833 the Great Western Railway was founded by Brunel and was seen as one of the greatest Victorian innovations (Crittall, 1959). The line ran from London to Bristol; the town of Swindon was created and this line impacted the transport industry allowing quicker and more efficient movement of

freight and also carriage of people. Section 219 of the Highways Act, 1846, '...authorized 4538 miles of new line at a capital value of £133 million...' to be built (Lowson, 1998: 16). The train as an innovation therefore developed so successfully and rapidly as it provided a crucial link to London and across the country in a shortened time; allowing businesses to trade nationally and thus allowing companies to expand their cliental and supply chain (Lowson, 1998).

Successive Progression of the Train

Following the steam engine was the electric locomotive; this innovation was driven by the increasing use of tunnels as steam was noxious. Electric locomotives equal in power to any steam locomotive were working in the period 1900-1910 however electric traction could not replace steam traction as electric trains were not suitable for long distance main line work due to speed-control limitations and the need for two overhead wires (Duffy, 2006). The World Wars also caused huge economic difficulties, so between 1914 and 1950 many electrification projects were stopped or put on hold thus further delaying the extensive implementation of the electric engine.

The first diesel powered locomotive which ran in 1912 was largely unsuccessful; diesel trains only gained wide-ranging acceptance as over time because technology such as welding techniques improved (Churella, 1998). The original patent for the diesel engine expired in 1912 and due to the relaxing of patent laws during the First World War, more than one hundred companies entered the diesel engine field (Churella, 1998).

In the 1920s it became apparent that the size, cost and power of the developments in steam engines were too great and electric power was too expensive to implement fully; so in the 1920s railroad executives expressed interest that diesel locomotives might produce savings over steam locomotives (Churella, 1998). Although by the late 1930s, Duffy (2006) states that electric locomotives were outperforming steam traction in every field and in the 1950s there were increasing demands for much higher speeds, well in excess of 100 mph, and the superiority of electric traction became evident. However, Churella (1998) goes on to discuss that, diesel engines started to replace steam locomotives in the 1940s due to them being more fuel efficient and having increased engine power but privatisation of UK railways slowed the implementation of new electrification even further because private operators found diesel traction cheaper (Duffy, 2006).

The innovative idea of the train has evolved since the nineteenth century with developments in technology, such as the diesel and electric engine allowing for the faster and more efficient running of trains, increasing business potential and revenue. The dominance of the steam train was great, as is often the case with successful innovations. Developments of the train towards diesel and electric engines demonstrate one of Rogers's five factors, relative advantage; in that the train engine was improved and developed making it more likely for the innovation to be adopted by society (Gourville, 2005). Existing steam technology at this point no longer produced considerable increases in performance with relation to cost (Churella, 1998).

Privatisation of the Train

In the late 1980's Margaret Thatcher initiated the privatisation of trains, public corporations and other assets (Naughton, 2008). It was the idea that was taken by the Conservative party was that of Adam Smith, which suggested the plan of allowing other train companies to run on British Rail tracks (BBC, 2000). There were two main reasons for why the idea eventually was passed through the first being to avoid the creation of monopoly companies within the rail service and the second being to complete the process before the government lost power. Cecil Parkinson (1990: 1) said '... the question now is not whether we should privatise it, but how and when...' therefore the decision was made to privatise the rail services. Movement of the privatisation really began in April 1994 when a plan was put in to place to sell 51 per cent of railway services in two years (Naughton, 2008).

The railway system was broken down into numerous individual private train companies and also was classed as several main components. These were Railtrack plc, who was the infrastructure owner, The Office of Passenger Rail Franchising who lets the passenger franchises to train operators, Train Operating Companies which are for the passenger franchises, Freight Operating Companies and Rolling Stock

Companies, The Office of the Rail Regulator and the Association of Train Operating Companies (ATOC). This break down made the railway system extremely complex, which still stands today, with around twenty five train operating services providing rail services (BBC, 2004).

Transport Industry Market Structure

A failed innovation before Trevithick's steam engine was the atmospheric engine invented by James Watt in 1776. It had insufficient power to weight ratio giving it no other use than that of a stationary winding engine (Lowson, 1998), which explains the reason for why it failed. Nevertheless, this innovation was the first entrant into this market and therefore James Watt was the leading mover. This does sometimes have its disadvantages with this innovation being no exception, in that the majority of market pioneers do indeed fail (Schilling, 2010).

However, in 1800 and therefore not long after Watt, as previously explained, was the invention of the train by Trevithick; he would be classed as an early follower, in that he had seen the opportunity and developed it further to be more successful (Schilling, 2010). After Trevithick we have seen that there were continuous developments to the train by many different people, resulting in many followers in the train industry. A key factor in train development was that it took a long time for the technology involved in the train industry to mature. As an example, early steam trains were known to be dangerous due to failing boilers, this could indicate why it took so long for the development to take off (Lowson, 1998).

Once the train took off it had a monopolistic hold over the transport industry and '... for all practical purposes stopped canal building dead...' (Lowson, 1998: 17). The major construction period of railways lasted for approximately fifty years however construction of new lines continued until 1940; trains have been developed continually building on the initial innovation and are still being enhanced today.

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Impact of Innovation on the Transport Industry

Innovations and advancements within the transport industry have not only impacted the U. K but the world. Eberts (2000) comments that with the invention of steam locomotives, wide changes and global developments were initiated within the transport industry, making trains, a key operator in the market economy. Litman (2010: 8) states that economic efficiency denotes '...the ratio of total benefits to costs...' and if it is achieved successfully within the industry then this will lead to increased productivity which in turn increases economic development. Optimising the efficiency of the transport system benefits the economy in numerous ways, with the ultimate goal being accessibility.

Other economic developments that the train has brought to society are; '... reduced shipping costs, which may increase profits and reduce retail prices as well as improvements in service quality and allowances for tax increases...' (Litman, 2010: 8). Bloy (2011) says that the train as an innovation created a large amount of national prosperity, more so than Free Trade; with new jobs being created thus reducing unemployment and new towns such as Swindon being formed. Technological advancements were encouraged with innovations such as control systems, signals, exports became increasingly popular and achievable on a national basis and abroad, allowing opportunity for increased revenue.

However, the train, especially in more modern times has impacted upon the environment in a negative way; the transportation industry, as a whole, is being held responsible for most of the emissions of pollutants today

(Rodrigue et al, 2009). As one of society's main focuses is on helping people
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change to become increasingly aware of environmental implications, the train industry now needs to find ways to reduce these negative associations. Better transport practices such as fuel efficient transportation methods need to be undertaken in order to benefit and help reverse some of the existing environmental damage (Rodrigue et al, 2009).

Continued and Future Development of the Train

Until the early twentieth century, trains were the primary mass transport system on land and had a monopoly prior to the development of the motorcar (International Union of Railways, 2010). There have been continued innovative developments of the train since the initial innovation to try to keep hold of the competitive advantage. Since 1903, in Germany it became apparent that the future of the train was electrical traction as it allowed for higher speeds and a smoother journey and the concept of a high speed rail (HSR) was developed (International Union of Railways, 2010).

The true HSR breakthrough started in Japan with speed being the major drive of new technologies and the idea was to service the need for greater capacity and meet the increasing demands for passenger rail travel (Hood, 2006). Japan being a densely populated country meant that both roads and the narrow-gauge railways were congested; so in 1959, to reach maximum capacity they began construction of the Tokaido Shinkansen. Hood (2006) describes this as a single high speed train line between Tokyo and Osaka serving almost 45 million people in 1959 and today well over 65 million.

Hood (2006) also mentions that although this was costly to build, it proved somewhat cheaper and more effective than its competitive alternatives

which were new highways and increased air capacity. Effectiveness and <https://assignbuster.com/train-as-an-innovation-of-the-transport-industry-economics-essay/>

efficiency of the HSR innovation were and still are key factors; by being sustainable and satisfying a country's needs (Grimshaw, 2002). Today, the Shinkansen line is the most heavily travelled high speed line in the world and still transports more passengers than all other high speed rail lines in the world combined (Hood, 2006).

Grimshaw (2002) comments on how new innovations relating to development of the train keep emerging within the transport industry, technology being the major factor as well as societies requirement for speedy travel, both currently and in the future. This seems to be apparent all over the world, with numerous plans for new high speed railway links in the United States, Britain and Spain (Grimshaw, 2002).

There has been a suggestion to build a high speed line between London and Glasgow; linking the two cities in just over two hours. Milmo (2009) comments that this line would not be in place until 2030 and could cost approximately £34 billion pounds. A development of this scale could prove a huge success and boost the transport industry but it would be costly and time consuming. However entering the market in 1992, Spain are now said to be on course to overtake Japan and France in the high speed train market with more miles of track allowing for faster travel and increased distribution allowing the country's economy to grow (Milmo, 2009). This shows that among countries across the world, speed and distance are key motivators influencing competition and how entrants into the high speed train market can succeed and increase a countries economy.

Conclusion

In conclusion, steam train technology was the market leader for a number of years meaning as with many innovations that initially enabling technology and the introduction of diesel and electric trains were not significant enough to be widely used; however the economics of steam meant that over time, these are now the main technology's used today. Without a doubt, the improved technology over the years, as well as increased leadership and a projected future growth of the train demand led to investments into enabling technologies to help improve the speed and reliability of trains. There are both positive and negative impacts when it comes to the train as an innovation and its impact on the transport industry. There have been economic and social benefits such as reduced transportation costs and job creation but on the other hand there are environmental drawbacks like pollutant emissions. Overall, the train is an innovation which has had a dominating effect on the development of society on a gigantic scale; it has improved countries' economies and shaped the transport industry and looks like it will continue to do so in the future.