

## Chapter 1. Introduction

### 1.1 Background

The 20th century has seen the popularity of high-speed rail for both passenger and freight trains to have significantly increased. The first major breakthrough in high-speed trains was back in 1964 (Japan), this provided rapid-mass movement and ever since it has had a major influence on the world's understanding of infrastructure (Lee, 2007). However, at that time the growth of high-speed trains was very slow, as they were very expensive to launch, with limited research and understanding available (Gourvish, 2009). In addition, as trains operated at lower speeds than compared to aeroplanes, this meant trains attracted little attention from fluid dynamists, therefore the complete understandings of train aerodynamics was neglected (Rahgunathan, Kim & Setaguchi, 2002). At the time the popularity of high-speed trains amongst society was also very low due to other alternatives available (Gourvish, 2009).

The means of transportation favoured by society was cars as they were more convenient, with lower fuel prices, and they provided an adequate means of rapid economic growth (Lee, 2007). This phenomena was repeated all over the world thus car popularity increased rapidly during the 19th century. However, since 1980s the transportation system, which primarily focused on cars, has been gradually changing (Lee, 2007). Many factors contributed towards this change, which included; higher fuel prices, congestion charges (road congestion), high road taxes, parking charges and air pollution (Gourvish, 2009). These factors aimed at limiting car usage and reducing its impacts on the environment while prolonging the life of natural resources. A change in policy also occurred such that a demand policy was implemented rather than a supply policy, and as a result this all contributed towards a sudden rise in railway transportation (Lee, 2007). Furthermore, many countries began to seek for methods which were environmentally-friendly, energy-saving and were capable of mass transportation due to their economic and social benefits (Lee, 2007). High-speed trains can meet these requirements as they can provide; high speed links between city to city transportation, mass transportation, safe and comfortable transport with minimal air-noise pollution, high reliability with low costs (Rahgunathan, Kim & Setaguchi, 2002). Many countries have since tried to adapt to a high-speed railway system, from as early as 1940 (figure 1).

## Chapter 1: Introduction

### 1.1 Background

The 20th century has seen a significant increase in the popularity of high-speed rail for both passenger and freight trains to have significantly increased. The first major breakthrough in high-speed trains was back in 1964 in Japan, this which provided rapid mass-mass movement for the first time and ever since it has had a major influence on the world's understanding of infrastructure (Lee, 2007). However, at At that time, however, the growth of high-speed trains was very slow, as they were very expensive to launch, and with limited research and understanding was available (Gourvish, 2009). In addition Additionally, as trains operated at lower speeds than compared to aeroplanes, this which meant that train aerodynamic design attracted little attention from fluid dynamists, therefore the complete understandings of train aerodynamics was neglected (Rahgunathan, 2002; Kim & and Setaguchi, 2002). At the time the popularity of high-speed trains amongst society was also very low due to other alternatives available (Gourvish, 2009).

The means of transportation favoured by society was cars as they were more convenient due to their convenience, with lower fuel prices, and that they provided an adequate means of rapid economic growth (Lee, 2007). This phenomena was repeated all over the world and thus the popularity of the car popularity increased rapidly during the 19th century. However, since the 1980s the transportation system, which had primarily focused on cars, has been began gradually changing (Lee, 2007). Many factors contributed towards this change, which included: higher fuel prices, road congestion charges (road congestion), high road taxes, parking charges and air pollution (Gourvish, 2009). These factors aimed at limiting car usage and reducing its impacts on the environment while prolonging the life of natural resources. A change in policy also occurred such that a demand policy was implemented rather than a supply policy, and as a result this all contributed towards which ultimately contributed to a sudden rise in railway transportation (Lee, 2007). Furthermore, many countries began to seek for method transportation technologies which that were environmentally-friendly, energy-saving and were capable of mass transportation due to their with greater economic and social benefits than the motor car (Lee, 2007). High-speed trains can could meet these requirements as they can provide; high speed intercity links between city to city transportation, mass transportation, safe and comfortable transport with minimal air-noise pollution, and high reliability with low costs (Rahgunathan, 2002; Kim & and Setaguchi, 2002). Many countries have since tried to adapt to a high-speed railway system, from as early as 1940 (figure 1).

**Comment [M1]:** A full stop should not be here.

**Comment [M2]:** I would suggest that the numbers for each section should be in the same font/colour as the heading title.

**Comment [M3]:** Usually it is better to keep all text in black - you can edit the headings styles easily in the 'Home' tab on Microsoft Word to save you having to edit each one individually.

**Comment [M4]:** Maybe say a little more on this.

**Comment [M5]:** I personally try to avoid starting a sentence with 'however' though this is your choice.

**Comment [M6]:** Say much lower?

**Comment [M7]:** Much less might sound better

**Comment [M8]:** Always include the date of separate authors/publications even if you are referring to two separate publications with the same date at the same instance in the text.

**Comment [M9]:** It is not conventional to use & in most academic work unless it is part of a trademarked name you are citing in verbatim.

**Comment [M10]:** This sentence would fit better earlier on (i.e., where you say the trains were expensive to launch).

**Comment [M11]:** This is the correct English (UK) spelling but your document is set to English (US) - I recommend changing the language to English UK.

**Comment [M12]:** Using a comma before the final item of a list is still debated by many - it's known as the Oxford comma and is a stylistic choice. Personally I use it when my list comprises longer descriptive phrases and it helps to distinguish the final list item - my personal rule is that if the penultimate item has an 'and' in it, I use the Oxford comma. This is entirely up to you though.

**Comment [M13]:** Do you mean 20th?

**Comment [M14]:** Some of the factors in your previous sentence ARE changes in policy - maybe revise this part to distinguish external factors (e.g., running out of oil) and policy changes (e.g., increased fuel prices).

**Comment [M15]:** I personally try to avoid starting a sentence with furthermore - most of the time it shouldn't be needed.

**Comment [M16]:** This sentence may be better before the sentence before it.