NATIONAL PASSENGER RAIL POLICIES AND THE EFFECT ON INVESTMENT, RIDERSHIP, AND CONGESTION

A Thesis Presented

by

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ABSTRACT

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June 2013

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This paper focuses on national passenger rail policies and the effect on investment, ridership, and congestion. Analysis is conducted of national passenger rail policies across three countries. Research consists of nation-specific passenger rail policies to include administrative structure, regulatory structure, and specific examples of regulation. Further analysis includes the matter of standardized global regulations, whether or not global regulations are beneficial, possible, and if any type of body exists that is able to develop such regulations. Additional passenger rail research includes the levels of infrastructure investment, annual ridership, and automobile congestion. The following three countries are researched and analyzed: the United States (U.S.), Germany, and Japan. From this research, conclusions are drawn with regard to the effect national passenger rail policy has on investment, ridership, and congestion. Administrative and regulatory recommendations are provided that help spur investment,

increase ridership, and may reduce congestion. These conclusions and recommendations suggest a non-governmental body should be established to standardize the process of regulation development and standardize the resulting regulations. The establishment of a non-governmental body to develop passenger rail regulations, and the changes to administrative structures will lead to increased investment and ridership, and may reduce auto congestion.

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CHAPTER 1

INTRODUCTION

How do national passenger rail policies effect investment, ridership, and automobile congestion? The type of passenger rail policy a national government chooses to pursue has a significant impact on every facet of a countries transportation system. It is particularly important to guide investment to the most efficient and effective mode of transportation for a particular geographic area; effective investment helps guide the type of future economic development. Well-defined policies play a key role in directing the right amount ridership to each mode of transportation that allows for efficient use of existing infrastructure. By effectively and efficiently directing investment and creating policies to better utilize all modes of transportation, a country reduces congestion. All of these goals are particularly important to each country, because choosing the right policies is key to achieving long-term sustainable economic growth.

All modes of transportation are important to a countries economy. Many national transportation policies for both air and auto travel are similar across countries. However, passenger rail policies differ greatly across the world's largest economies. In some countries, the passenger rail system is considered one of the most critical modes of travel in the country, while other countries see passenger rail as an afterthought. These extremes are not the norm, but rather the exception to policies that place all modes of transportation on a level playing field. The national transportation policies that are the most effective are the policies that attempt to maximize the use of each mode, when applicable, and that includes prioritizing passenger rail when necessary.

A particularly effective approach to prioritizing national passenger rail systems would be the standardization of the process used to develop regulations, as well as the development of a set of standardized global regulations. An independent body in consultation with national governments can develop regulation standardization. While such an organization exists, the adoption of such rules by national policy makers is sporadic and mainly centered in Europe.

One such independent body that develops standardized regulations is the Union of International Railways (UIC), a non-governmental body located in Paris, France. While many countries are members of the UIC, the organization is seen as European centric and plays a much smaller role outside of Europe. No member country of the UIC is required to adopt proposed regulations, but the European Union (EU) and European national regulatory bodies and operators work with the UIC to develop standardized regulations to create efficiencies and streamline cross-border operations.

The regulations developed by the UIC are created by staff from national train operators and infrastructure owners, who provide a wealth of technical knowledge toward the creation of regulations. Regulations are developed by specific regional and subject area working groups, who upon adoption forward the regulations to the General Assembly for approval.[1] Upon approval by the General Assembly, the UIC releases new and updated regulations through document known as leaflets.[2] Leaflets are used by national regulatory bodies to draft passenger rail regulations. The collaborative approach of the UIC is one example of a non-governmental agency that can assist in the development of standardized and improved passenger rail regulations and policies.

There are historic examples of standardization in other sectors, which have been shown to be beneficial to the growth of national economies. One example is the standardization of shipping container sizes by the International Organization for Standardization (ISO). The standardization of shipping container size helped bring about the increase in global trade during the latter half of the twentieth century, through increased efficiency and effectiveness in the movement of goods. "ISO's role was not just that of securing agreement on standard sizes for those boxes; ISO was also involved in setting standards for the ships and trains that carried the containers, the docks where they were loaded and unloaded…the list of physical infrastructure goes on."[3] Without the standardization of shipping container sizes, the ease at which goods move around the world would have been greatly diminished. The same results may be achieved for national passenger rail system.

CHAPTER 2

RESEARCH METHOD

Calculating the effect that national passenger rail policies have on investment, ridership, and congestion, requires a comparison of policies and data between different countries. An equitable analysis can be conducted by comparing the largest economy, by gross domestic product (GDP) in each of the three largest regional economies (by continent) in the world: Europe, Asia, and North America. The largest economy in Asia is China, in Europe is Germany, and in North America is the U.S.[4] The U.S., Chinese, and German economies represent the largest, second largest, and fourth largest economies in the world respectively.[5] However, China is substituted for Japan in this analysis; the third largest economy in the world and second largest in Asia. Comparing the Chinese economy with that of Germany and the U.S. does not provide an equitable analysis considering the overwhelming and direct role the Chinese government plays in private industry. While the governments of the U.S., Germany, and Japan have a significant level of influence over private industry, there is still a level of separation between the public and private sectors; this is not the case in China. Including China would not provide a balanced analysis.

Japan, Germany, and the U.S. are the countries selected for this analysis due to the fact that each country has the largest economy on the continents with the largest economies; China was not selected for the reasons already mentioned. It can be assumed that the countries with the largest economies on each continent will likely have the most advanced transportation system, providing for an equitable analysis. In order for a national economy to thrive, the transportation system has to be multi-modal and relatively well maintained to provide for the free flow of people and goods.

Analysis can be conducted between countries on the same continent. However, national policies are likely to be more homogeneous among countries on the same continent than compared to policies developed on different continents. By analyzing countries with the largest economies on different continents, it is likely that the policies will differ significantly. In addition, transportation investment levels from the largest economies on each continent are likely to be similar as a percentage of GDP, allowing for a balanced comparison. The countries chosen allow an equitable analysis of data on a broad range of national passenger rail policies.

The qualitative research in this paper consists of data retrieved that is related to the following variables: administrative structure, regulatory structure and specific regulations of national passenger rail systems. Quantitative variables include identifying levels of transportation investment, ridership, and auto congestion levels.

Primary data is retrieved from a multitude of sources, including the CIA World Fact book, the World Bank, the websites of public and private national passenger railroad corporations, and data from national research and statistics bodies such as the European Commission, the Federal Railroad Administration, and the Japanese Statistics Bureau. Secondary data is collected from transportation research groups including the American

Public Transportation Association (APTA), the UIC, and multiple transportation and economic research groups, books, and articles.

The methodology used includes both qualitative and quantitative analysis. Qualitative analysis consists of comparing the administrative structure of the passenger rail system in each country. The administrative structure compares whether or not rail operations are conducted by public or private entities, and whether public or private entities own, construct, and maintain the right-of-way and associated system infrastructure. Additional qualitative analysis includes how regulations are developed, which organization is responsible for creating and overseeing said regulations, and specific examples of regulations that may support or be detrimental to the success of passenger rail.

Quantitative analysis includes a comparison of the level of national investment in passenger rail infrastructure. Passenger rail investment is meant to cover the investment in regional passenger rail systems (systems operating at <100 km from a city center), intercity passenger rail (systems segments operating between 100 – 600 km in total length), and long distance passenger rail (600 km + in total length). These systems are characterized by operating train consists over longer distances and with fewer stops than localized "heavy rail" and "light rail" service.

When possible, urbanized public transit systems utilizing "heavy rail" and "light rail" systems are not included in the data. Investment data is compared at a national and regional level and is conducted using investment levels as compared to a percent of GDP.

Annual ridership is a particularly useful set of data that helps determine popularity of passenger rail travel and is compared to specific public policies, as well as investment levels and congestion. Both levels of investment and ridership tie in to the final variable of auto congestion. The analysis of auto congestion includes comparing congestion levels for the five largest metropolitan areas in each country.

All of the qualitative and quantitative data sets are provided so the reader is given a broad understanding of national passenger rail policies in the U.S., Japan, and Germany. The data sets are meant to provide clear and concise data that is easily analyzed by the reader, so that they may be able to recognize patterns and easily reach basic conclusions as to the effect of different national passenger rail policies on infrastructure investment, ridership, and automobile congestion.

CHAPTER 3

NATIONAL PASSENGER RAIL ADMINISTRATIVE STRUCTURES

The administrative structure of a national passenger rail system is a great starting point for analyzing the effectiveness of any particular national system. Administrative structure shows whether public or private entities take the lead with Right-of-Way (ROW) ownership and passenger operations. For the purpose of this research, administrative structure is meant to describe whether the right of way on which trains operate is owned and maintained by a public or private entity and whether or not operations are conducted by a public or private entity. There are four types of administrative structure:

Table 1 - Types of Administrative Structure

Type of System	ROW Ownership	Passenger Operations
Type 1	Private	Public
Type 2	Public	Public
Type 3	Public	Private
Type 4	Private	Private

Administrative structures in the U.S., Germany, and Japan include types one, two, and four. While these three countries do not include a type three system, many countries have moved in that direction including the United Kingdom, while Germany has currently tabled plans to privatize passenger operations. However, the type three systems will be analyzed as part of the German administrative structure section.

U.S. Administrative Structure

The U.S. passenger rail system operates as a type one system, in which the majority of ROW is owned and maintained by private industry, while passenger operations are conducted by a publicly supported agency.

Passenger rail in the U.S. began as a private enterprise system, in which private companies both owned and maintained the right of way, in addition to operating service. In the modern era, passenger rail service is provided by both Amtrak and commuter rail type systems, which are administered by large metropolitan transit authorities; both organizations are public entities. Of note, while Amtrak may technically be a private company, Amtrak requires annual publicly funded subsidies for both capital and operations in order to continue to operate. A majority of Amtrak routes operate over privately owned ROW, while commuter rail systems operate on a mix of both public and privately owned ROW. This current administrative structure was a result of the failure of private passenger railroads rather than clearly defined and planned national passenger rail policy.

The private passenger rail system in the U.S. was extremely successful and profitable until the 1920s. World War II (WWII) saw a major increase in rail use due to the war and the railroads began somewhat of a renaissance, replacing outdated equipment with sleek-modern looking train sets that traveled at speeds over 100 miles per hour. However, during the post-WWII period, air travel began to increase in popularity, the automobile became affordable, significant government subsidies went to the creation of the interstate system, all of which reduced railroad ridership. Government subsidies, coupled with outdated and burdensome regulations led to the bankruptcy of nearly all privately held passenger railroads in the U.S.

In 1971, the Federal government was forced to take action to save domestic passenger rail service. The Nixon administration created the National Railroad Passenger Corporation (NRPC), which operates as Amtrak. To this day, Amtrak has managed to limp along on a highly elastic and insufficient government funding structure. At the same time that Amtrak was formed and over the following two decades, local commuter rail operations were turned over to public entities as well as the private companies entered bankruptcy.

Amtrak and commuter railroads received equipment and infrastructure from the private railroads that was unreliable, inefficient, and extremely expensive to maintain. In the case of both Amtrak and commuter railroads, the outdated equipment and poorly maintained infrastructure led to cuts in service across the country. One bizarre twist that came from the creation of Amtrak was the continued ownership of right-of-ways (ROW) by private railroads. This created a system unique to passenger rail operations, in which ROW is owned and maintained for freight use by private companies, while passenger rail operations are conducted by publicly funded entities. The Railroad Revitalization and Regulatory Reform act of 1976 allowed Amtrak and other states to purchase some ROW, mainly in the Northeast U.S, including allowing Amtrak to purchase a majority of the Northeast Corridor and several other right-of-ways.[6]

Japanese Administrative Structure

The Japanese passenger rail system operates as both a type two and type four system, in which the largest portions of the system are completely privatized which represents three of the six Japan Railway Group (JR) divisions. The other three JR operating divisions have publicly owned ROW, whose operating divisions are subsidized by the Japanese government.

The Japanese passenger rail system began as a public system, under the title Japan National Railway (JNR). JNR owned both the ROW and conducted passenger operations. JNR was a massive organization, and although they operated a relatively popular passenger rail system, there were "numerous organizational problems, including complacency due to a lack of a sense of crisis, an antagonistic labor-management relationship, and political interference."[7] The year JNR introduced high-speed service it began to operate at a loss.[8] Over the years financial losses continued to mount, which were covered by an increased government subsidies. With a goal of improving the performance for the national passenger railroad through structured privatization, JNR was split in to seven different companies in 1987. Six of these companies focused solely on passenger operations, and the seventh focused exclusively on the movement of freight. Passenger systems were split in a geographic manner, in which each major new division maintained and operated service over a major route and provided a majority of trunk line feeder service.

One important element of the privatization of JNR was the multi-step process that the government of Japan undertook to ensure the successful transition from government run company to private ownership. The first step in the multi-step process started with the initial purchase of all JNR shares by the Japanese government, which over time sold the shares, bit by bit to ensure a smooth transition. This multi-step process ensured a gradual transition that made a profit for the government and reinsured private investors of the government support for private ownership. While the Japanese government was successful in privatizing JR East, JR West and JR Central in the mid 1990's, three of the operating divisions remain under government ownership due to the lack of profitability.[9] JR Hokkaido, JR Shikoku, and JR Kyushu continue to have all shares controlled by the Japanese government.

The Japan Railways Group is the parent company of all six JR passenger operations. JR East, JR West, and JR Central are completely privatized systems, in which the ROW is owned and maintained by the private sector and on which private passenger operations occur. The remaining three JR companies: JR Hokkaido, JR Shikoku, and JR Kyushu are part of JR, however, passenger services have not been determined to be self-sustaining and therefore the Japanese Government continues to be the sole owner of these three systems. In addition to the JR Group, there are 149 additional private rail operators, which carry almost as many annual riders as the JR Group.[10] These additional 149 private rail operators are privately operated passenger rail systems in which the public sector owns all or a large portion of the ROW and includes many subway systems and therefore are not included in the statistics in this report.[11]

German Administrative Structure

The German passenger rail system operates as a type two system, in which the ROW is owned and maintained by the public sector, and the majority of passenger operations are undertaken by a publicly subsidized agency.

Passenger rail service in Germany is provided by the publicly owned Deutsche Bahn AG (DB AG), which was created with the unification of Germany's railways in 1994.[12] DB AG organizes business functions into difference branches, which include passenger rail operations conducted by DB Bahn, and ROW ownership and maintenance overseen by DB Netze. While passenger rail in Germany is overseen by a national agency, Germany must adhere to EU regulations as well. One such important EU regulation relating to administrative structure is the requirement to separate ROW ownership and maintenance from passenger operations, as specified in EU Directive 91/440/EEC.[13] This EU directive was developed in order to promote cross-border competition among both privately and publicly owned operators, much like the aviation industry. The new EU directive will continue to move not only Germany, but other EU countries toward a type three system, in which private operators provide service on publicly owned ROW. The EU directive promotes the creation of additional operational efficiency by increasing the level of competition. Over time this directive may squeeze out publicly owned operators, replacing them with private operators.

DB AG was supposed to undergo a privatization process, which would remove any governmental ownership of the company. The privatization process began in 1994 and continued through the late 1990's.[14] Although DB AG can technically be considered a private company, nearly all of the shares that were created as part of the multi-step privatization process are owned by the German government.[15] Continued government ownership can be attributed to a halt in an Initial Public Offering (IPO) process in 2009 and a 2011 transportation crisis.[16] The IPO release was cancelled in light of the global economic recession in 2009 and because of the crisis during the Winter of 2011, during which thousands of travelers were stranded and delayed for hours and days.[17] This 2011 winter incident, combined with continual poor on-time performance led to a rethink of the privatization process and the selling of government owned shares.

In the lead up to the IPO in 2009, the government had a goal of increasing profitability in order to increase the IPO share price. Unfortunately, the goal of increased profitability was obtained through a reduction in capital investment in ROW and rolling stock maintenance, which resulted in the Winter crisis of 2011. Privatization of DB AG was meant to create an increase in private investment in the railroad, while at the same time improving efficiencies and removing the need for subsidies.

Since the Winter crisis of 2011, the privatization process has been scaled back even further. The privatization plan has since been modified to create a system in which ROW will be owned and maintained by the German government (under the name DB Netze) and operations would be conducted by a fully privatized DB AG, removing the goal of complete privatization. Additionally, the German government added an additional requirement that DB AG separate all business units and associated funding.[18]

The scaled back privatization process came about not only because of the credit and Winter 2011 crisis, but the desire to ensure the continued operation of local and regional routes. The current setup of DB AG, allows the profits from successful routes, mainly high-speed services, to subsidize the losses of local and regional services. This new separation of all business units means that it is now possible for the German government to own the shares and oversee operations of some local and regional DB routes, while the major routes are privatized. Full privatization of DB AG services would have likely resulted in the elimination of a large portion of local and regional service.

While DB AG is the largest passenger rail operator in Germany, and is responsible for operating a large portion of local and regional passenger service, many of these services are contracted out to private companies by regional state governments.[19] With the revamped DB AG privatization process, DB AG could lose additional local and regional routes to privately owned passenger operators. It is quite clear that ROW ownership and maintenance will continue to be overseen by the public sector. While German privatization plans have stalled, it appears the only routes that may be privatized will be major high-speed and intercity routes, which are the only routes that are currently profitable.[20]

Administrative Structure Summary

Comparing national passenger rail administrative structures can be better understood by looking at data that shows the type of national commitment. This can be achieved through looking at total ROW kilometers and the percent used for passenger rail service. Both these elements serve as a direct reflection of the level of investment into passenger rail service. The more kilometers of ROW in national rail system, the larger the overall investment. Passenger rail ROW requires increased investment levels over that of ROW that is used for freight purposes only. Therefore, the more kilometers of ROW for passenger service, the larger investment required.

The different types of national passenger rail administrative structures have substantially different statistics relating to total national ROW length as compared to land mass and ROW length used for active passenger service. Table 2, located below, provides a summary of the type of administrative structure for the U.S., Germany, and Japan:

Table 2 – National Administrative Structure

Country	ROW Ownership	Passenger Operations	Administrative Structure
United States	Private^	Public	Type 1
Germany	Public	Public*	Type 2
Japan	3 – Private / 3 - Public	3 – Private / 3 - Public	Type 2, 4

^ Several ROW segments and routes are owned by Amtrak and publicly owned commuter rail agencies; a majority of ROW is controlled by private railroads.
* While Deutsche Bahn (DB AG) is privatized, all shares are owned by the German government, making DB AG a public company.

Table 3, located below, shows each countries total national ROW (km), total land mass (sq. km), and ROW per sq. km of land mass. Germany has the highest percentage of ROW length per sq. km. at 9.5%, Japan is second with 5.5%, and the U.S. is third with just 2.5%.

Table 3 – National ROW Length & Land Mass

Country	Total National ROW (km)[21]	Land Mass (sq. km) [22]	ROW per sq. km. (%)
United States	226,427	9,147,420	2.5%
Germany	41,896	348,610	9.5%
Japan	26,435	364,500	5.5%

This statistic is useful as a comparison between Germany and Japan, based on the similar land mass area for each country. However, the data may not be as useful as a comparison between the U.S. and Japan or Germany. The ROW length in the U.S. might be much lower as a percentage than Japan or Germany simply for the fact that the U.S. is twenty six times larger than Japan and Germany. A higher percentage of ROW length in the U.S. may not be necessary for a successful national passenger rail system given the large swathes of rural land, which is not conducive for passenger rail service.

Table 4, located below, shows the percentage of national ROW length used for passenger service. These statistics show similar results as that of table 3. The country with the type two system has the highest percentage of ROW used for passenger service, followed by the type four system, and with the lowest percentage, the type one system.

Table 4 – National ROW for Active Passenger Service

Country	ROW km. for Active Passenger Service (km)	Passenger Service % of Total National ROW (%)
United States	47,225[23]	21%
Germany	32,723[24]	78%
Japan	12,483[25][26]	47%

When looked at together, all of these statistics show some similarities between tables 2, 3, and 4. First, the country with the longest total national ROW length, second longest, and shortest total national ROW length rank in the same order for total national ROW length used for passenger service. The rank is also mirrored between table 3 and table 4 when comparing ROW length as a percentage of landmass and passenger service percentage of total national ROW. A third similarity between the two tables is the similar increase in ROW length between the countries with the lowest, second largest, and largest percentage; as seen here:

Table 5 – National ROW Increase Comparison

Country	ROW per sq. km.	Passenger Service % of Total National ROW
United States	-	-
Germany	3.8 times larger than U.S.	3.7 times larger than U.S.
Japan	2.2 times larger than U.S.	2.2 times larger than U.S.

While this administrative structure analysis may not provide proof of a correlation between administrative structure and overall national commitment to passenger rail, each data table shows several similarities. It is possible that there may be some level of correlation between the type of administrative structure and the national priority placed on passenger rail service. It is the national priority placed on passenger rail that is important and can result in both positive and negative impacts with regard to investment, ridership, and automobile congestion levels.

CHAPTER 4

NATIONAL PASSENGER RAIL REGULATORY STRUCTURES

In addition to national administrative structure, the regulatory structure and the specific regulations developed by those structures may also play a role in passenger rail investment, ridership, and automobile congestion levels in the U.S., Japan, and Germany.

The reason behind the regulation of the passenger rail industry is similar to that of other industries. Regulations are meant to provide safety and security, all while creating an environment in which business can thrive. Every national passenger rail system has some level of regulation and some form of regulatory structure to develop, adopt, and oversee compliance with said regulations. The regulatory structure of national passenger rail systems is different from country to country, but general falls within to two distinct types, which include:

Table 6 – Types of Regulatory Structure

Type of System	Regulation Development	Regulation Adoption	Regulation Oversight
Type 1	Government Agency	Government Agency	Government Agency
Type 2	Government Agency / Non-Government Agency	Government Agency	Government Agency

No form of regulation is developed in a vacuum. In a type one system, the government agency will work with and consult industry associations and other non-governmental bodies in the development of regulations. However, the government agency is ultimately responsible for the development and oversight of adopted regulations. In type two, the non-governmental agency will take the lead role in many cases in the development of regulations, usually in conjunction with government agencies. The government agency will be responsible for adoption of the mutually developed regulations and all oversight responsibilities. The type two form of regulatory structure is particularly helpful for passenger rail networks that cross national boundaries, while type one is mainly used for systems that do not cross national boundaries or for countries that wish to create a system of standardized national regulations among different internal regions.

There is currently no global passenger rail regulatory structure, or global body that develops standardized passenger rail regulations among all countries. However, such a body does exist, but the regulations are developed on a regional level rather than a global level. If global regulations were to be developed, this would represent a third type of regulatory structure, very similar to type two however, except for the fact the regulations would be enacted globally rather than among a smaller regional body or group of countries.

This section mainly focuses on the development of regulations in the U.S., Germany, Japan, and the possibility of implementing standardized global regulations. The adoption and oversight of regulations is largely standardized across countries, but the development of regulations differs greatly across countries.

U.S. Regulatory Structure

The Federal Railroad Administration (FRA), a branch of the United States Department of Transportation (USDOT), is responsible for all aspects of passenger rail regulation to include development, adoption, and oversight. The FRA was created in 1966 and eventually took over the role of passenger rail policy development and safety regulation from the Interstate Commerce Commission (ICC). Many of the regulations developed by the ICC have been adopted by the FRA, most of which were developed prior to the 1960s, including some dating back to the 1920s. There are two major non-governmental organizations in the U.S. that play a role in developing passenger rail regulations. The American Associations of Railroads (AAR) and the American Public Transit Association (APTA) have both worked with the ICC and the FRA to develop passenger rail regulations, however not simultaneously. The AAR worked with the ICC and the first several years of existence of the FRA to help develop and update regulations. However, when the private railroads moved away from passenger rail in the early 1970s, the AAR began to focus on freight rail regulation and dropped passenger rail regulation cooperation.[27] Since APTA was established, both the FRA and APTA have worked together to develop regulations. However, many of the APTA regulations are derived from those regulations that were originally adopted by the ICC. What has occurred over the past forty years is that both the FRA and APTA have used the ICC regulations as a base on which to develop new regulations. Instead of developing regulations that alter or reinterpret those proposed by the FRA, APTA has in many cases developed regulations that may be more restrictive than those proposed by the FRA, due to the fact that they are based on ICC regulations.[28]

The development of passenger rail regulations in the U.S. by the FRA is considered a type one system, in which the FRA is fully responsible for developing regulations. This is in contrast to a type two regulatory development structure in which regulations are developed in by a non-governmental agency in conjunction with the national regulatory body. The type two structure usually consists of a non-governmental body that develops the regulations, which are subsequently adopted by a national regulatory agency.

The FRA has begun to implement the process of moving toward a hybrid regulatory development system. The FRA has created the Railway Safety Advisory Committee (RSAC), which consists of government agencies, non-government agencies and other associated industry groups. Work by the RSAC is ongoing and regulations enacted by the FRA have yet to change. The RSAC is supposed to review FRA regulations and suggest changes rather than completely re-doing existing regulations or look at the regulations enacted by other countries or non-governmental organizations outside the U.S. While the RSAC develops new regulations, the FRA has recommended that organizations apply for a regulatory waiver if the new service they wish to operate does not meet FRA safety requirements.[29]

Japanese Regulatory Structure

Passenger rail regulations in Japan are developed and implemented by the Ministry of Technical Standards for Railway (MTSR). The Japanese regulatory structure is centralized in the hands of the national government under the technical standards ministry. However, since the mid ‘90s, de-regulation has been one of the main priorities of the ministry, with the goal of increasing competition for public and private sector participants, all while maintaining significant safety standards.[30] The goal of increasing competition has led to increased regulatory input from public and private operators and infrastructure owners in the development of regulations.

The ministry develops the laws for passenger rail regulations, which are subsequently interpreted into technical standards. The proposed technical standards are released for review by the ministry and feedback is provided by the public and private operators and infrastructure owners. The feedback provided by operators and owners is reviewed and incorporated into finalized regulations.[31] Finalized technical standards and adopted regulations are titled: “Ordinance of the Ministry for Technical Standards for Railway,” which are subsequently adhered to by operators and enforced by the ministry[32] This feedback process has been so successful that before privatization reforms began technical standards and guidelines numbered 812 individuals regulations and since the introduction of reforms have been reduced to 120 total.[33] This reduction in regulations has not had an effect on national passenger rail safety.

The most significant change in regulation relating to passenger rail reform was the movement toward operator and infrastructure owner proposed guidelines, rather than having the regulations developed and implemented by the ministry. This change has created a system in which the operators and owners adopt standards specific to the ROW that they own and operate service, rather than a specific figure or exact standard developed by the ministry. While the ministry may specify technical regulations that should be adopted, the owner and operator does not need to adhere to the specific technical aspect of the regulation, so long as they meet the overarching goal of the regulation. Such an example includes, "(the) radius of curvature shall be set in order not to impair safe car operations, taking the performance capability of negotiating a curve, the operation speed and other relevant factors (are taken) into consideration."[34] This is translated into a specific regulation by the ministry and is "radius of the curve…shall be 400 meters or more."[35] Operators are not required to follow the 400-meter curve radius regulation, so long as they can prove operations are safe. The operator is only required to meet the overarching goal of the regulation, not the specific technical standard.

German Regulatory Structure

In Germany, as with many countries in Europe, the regulation of passenger rail is developed in a different manner than that of both the U.S. and Japan. In the U.S. and Japan, the responsibility for the development of regulations is conducted by a government agency with differing levels of input from third parties. In Germany, and most of Europe, a non-governmental agency takes the lead in the development of passenger rail regulation. The German government is responsible for developing regulations, in addition to the European Union, but the main goal of the national and supra-national regulators is to adopt and conduct oversight of said regulations. The governmental regulatory bodies believe that creation of regulations by a non-governmental agency will be the most efficient and effective in ensuring safe passenger rail operations.

The German and European approach to passenger rail regulation was developed over time to lessen contrasting national regulations, which make cross-border travel much more difficult. In Europe, cross-border coordination has helped achieve improved economic success; a key factor of this success has been standardized transportation regulations. The close proximity of so many countries in Europe has helped form a process in which coordination equals greater success for all, while competition among countries (in the form of differing regulations) only hampers economic growth. This coordinated approach is also based on Europe's historical reliance on formal institutions to coordinate interactions and focus on long-term relations rather than short-term competition.

The coordination of regulations in Germany and Europe can be seen in the role that the UIC has played in the development of standardization of regulation. The UIC has played a very active role in developing regulations, promoting national cooperation, technical harmonization, and interoperability since 1921.[36] Members of the UIC include railway companies, infrastructure managers, railway operators, rolling stock and traction leasing companies, and service providers; 197 member in total.[37] UIC regulations and recommended policies do not require mandatory implementation by national and E.U. regulators; however, they are a "major component of acceptance criteria" and have provided long-standing best-practice standards across the continent.[38]

The European Railway Agency (ERA) is an E.U. governmental agency that plays a similar role to that of the UIC, with regard to developing regulations, but is also responsible for the oversight of specific E.U. directives. The ERA, the UIC, and national regulatory bodies all work together to ensure standardization and effectiveness of passenger rail regulations.

A major difference between the UIC regulations, and those of the EU is that Germany must adhere to EU directives, but is free to ignore UIC regulations. The ERA is responsible for working with all EU member states to harmonize and coordinate passenger rail regulation. The ERA "does not have decision-making powers as such, but it can present opinions, recommendations and proposals to the (EU) Commission."[39] "It is independent, but works in close cooperation with experts in the field."[40] Such experts in the field include the UIC and members of regulatory agencies in EU member countries. While the ERA and other EU member countries work together to develop regulations, the UIC plays a vital role in bringing the technological knowhow to the table in order to assist in the development of regulations, and provide recommendations. Upon completion of the development of proposed regulations, the EU Commission may subsequently adopt the proposed regulations, which then must be followed by all EU member countries. Adopted regulations are released in the form of railway packages, which include a packaging of multiple regulations together. To date four railway packages have been released, ranging from safety and security, to administrative structure and market liberalization.[41]

The German and EU type two regulatory system, in which most regulations are developed by a non-government agency, while adoption and oversight of regulations are conducted by national and supra-national bodies. One particular key to this type two system is that the non-governmental agency has a goal of not only promoting the industry they represent, but also developing regulations that ensure safety and maximize performance. In many industries other than passenger rail regulation, leaving the industry itself to develop regulations could create serious problems. However, in the passenger rail industry, the level of oversight is significant and the historical coordinated approach to regulation in Europe has created a system in which all sides benefit. A type one system in which a national body develops regulations could not work in Europe, simply due to the geographical makeup of the continent and the need for efficient and effective cross-border transportation.

Global Standardized Regulatory Process & Policies

While the U.S., Japan, and Germany all develop passenger rail regulations in a slightly different manner, each country may benefit from a standardized process regulation development process. A standardized process may bring about improved policies, and these policies may create economies of scale. This standardization could be brought about by one non-governmental agency taking the lead in regulation development.

The U.S. develops passenger rail regulations based on historical precedent and with minimal input from non-governmental agencies. In Japan, a government agency develops regulations at the national level, however, regulations are general in nature and interpretation is left up to each operator, which is held responsible for ensuring passenger safety based on the overarching national regulations. In Germany, European integration has required that non-governmental agencies develop regulations in conjunction with national and supra-national bodies, to ensure the efficient, effective, and safe delivery of passenger rail services to the traveling public. While each country develops passenger rail regulations in a slightly different manner, one area of regulation development is consistent among all countries and that is the presence of a government agency. In no case is a non-governmental agency solely responsible for the development, approval, and oversight of passenger rail regulation. The role of non-governmental agencies is limited to the development of regulations, and this development ranges from a hands-off approach in the U.S. to a fully coordinated effort in Germany and the rest of Europe. In every case however, it is the government's responsibility to develop (range of development varies), approve, and conduct oversight of all regulations. This commonality shows that all three countries agree that a governmental agency must hold the operators accountable and at a minimum adopt and conduct oversight of passenger rail operators. Therefore, it is important to look at where each country differs, what processes and policies may be standardized and if process standardization may bring about improved policies and economies of scale.

The adoption of a global set of standardized regulatory processes and policies could pay off substantially for all countries operating passenger rail systems. Such a system already exists for international passenger air traffic. The International Civil Aviation Organization (ICAO) is a United Nations agency, which "develops policies and standards, coordinates global monitoring, analysis and reporting initiatives, and delivers targeted assistance and capacity building."[42] ICAO is responsible for developing Standards and Recommended Practices (SARPs), which are regulatory measures that are broad in scope, interpreted by member countries and subsequently implemented for all international flights. ICAO also develops Procedures for Air Navigation Services

(PANS), which are more technical in nature and are subsequently adopted by member countries.[43]

The benefit of such an organization as ICAO is the ability to bring multiple countries together to develop regulations as part of a standardized process. The development of a standardized regulatory process by a non-governmental organization such as ICAO, allows for the streamlining of national policies and can create an efficient and effective international transportation system. Standardized regulations between countries make cross-border travel easier and less burdensome for operators. The PANS developed by ICAO also allow for economies of scale, by creating standardized technical aircraft manufacturing requirements, reducing the need for individual country specifications. The safety and security regulations developed by ICAO for international aviation can also be done for national passenger rail systems.

As stated, passenger rail regulations are developed to ensure a level of safety and security for passengers, while at the same time allowing the passenger rail industry to thrive. In the cases of the U.S., Germany, and Japan, it is clear that regulations are developed in a manner to ensure the safety and security of passengers. However, only in Germany and Japan are regulations developed that are meant to support the passenger rail industry itself. While safety and security are paramount, developing regulations that support the passenger rail industry is also important. The development of regulations that are geared toward the promotion of specific industries can help improve operating performance and service delivery, in addition to ensuring passenger safety and security.

In order to better understand the three specific reasons for the development of regulations, they have been outlined below:

1.) Safety: Passenger safety is the most important element of passenger rail regulation. Trains must be manufactured in a way that ensures passenger and operating safety and operators must adhere to operating regulations so that accidents can be avoided. Safety regulations include the development of technical specifications which set standards relating to the speeds at which trains can travel, they way trains are manufactured, how quickly trains can traverse corners, the manner in which trains operate (i.e. personnel requirements), and the manner in which ROW and track is constructed and maintained.
2.) Security: Passenger security is also very important to ensure that each passenger, the train, and the ROW is safe from individuals that wish to create any type of disruption that could lead to injury or death. Security regulations include regulation related to boarding protocols, ticketing procedures, and ROW security measures such as video monitoring, fencing, and intrusion alarms.
3.) Industry Promotion: The promotion of the industry that is being regulated is not a universal occurrence, however, it can be very important. The area of regulation relating to industry promotion is directly tied to safety and security regulations and the content of those adopted regulations. In order to ensure the adoption of safety and security regulations that promotes the passenger rail industry, input must be received from stakeholders. Industry promotion is important because it has a direct effect on the financial and operating

performance of passenger rail operators and can be directly responsible for the success or failure of the passenger rail system as a whole.

The U.S. is a perfect example of a country where the developmental process of safety and security regulations has sidelined the idea of industry promotion and the result can be seen in annual ridership statistics. In the U.S., safety and security regulations are developed in a vacuum by the FRA, based on historic precedent rather than technological advancements and stakeholder input. In Japan, the regulatory body develops broad scale safety and security regulations, leaving it up to operators to meet broad scale regulations; much like the SARPS of ICAO. The operator is able to operate trains in any manner that they deem safe and secure, so long as they meet the goals of the overarching regulations. In Germany and the rest of Europe, safety and security regulations are developed by a non-governmental agency, usually in conjunction with national and supra-national regulatory bodies. This non-governmental agency, the UIC, includes passenger rail operators and infrastructure conglomerates, which seek to not only ensure safety and security but industry promotion as well. The UIC is similar to ICAO, except while the UIC is a global organization, regulation development is focused mainly on Europe. This German and European approach allows both sides to create regulations in a like-minded and coordinated effort, ensuring that all parties are satisfied with the outcome.

Examples of safety and security regulations in Germany, Japan, and the U.S are provided as evidence of either the effectiveness or ineffectiveness of national regulatory policies and the specific results of those regulations. These examples will provide evidence as to the shortfalls of the U.S. approach and why the adoption of standardized regulations by a global non-governmental body may be beneficial to all national passenger rail systems.

CHAPTER 5

SPECIFIC NATIONAL PASSENGER RAIL REGULATIONS

The world of passenger rail safety and security regulation is quite complex and includes specifications for nearly every possible element of the production and operation of passenger rail vehicles. I will attempt to simplify the description of two distinct regulations, which I feel have the largest impact on industry promotion. These two areas include crashworthiness specifications and cant deficiency & super elevation regulations, when combined are known as unbalanced super elevation. FRA regulations for passenger rail equipment can be found under Code of Federal Regulations (CFR) Title 49, Part 213 & Part 238, UIC recommended safety regulations are found in documents known as UIC Leaflets, and the Ministry of Technical Standards for Railway is responsible for publishing regulations in Japan.[44][45]

Regulation #1: Crashworthiness

One area of regulation that differs widely between the U.S., Germany, and Japan is crashworthiness standards. These standards have been developed to protect the occupants of a train in the event of a collision or derailment.[46] There are several design elements relating to crashworthiness standards, and the one that I will focus on is *buff strength*. Buff strength is defined as the "largest force a vehicle structure can sustain without collapsing."[47] This is developed to limit the area of a vehicle that collapses during collision to the first two to three feet.[48]

Buff strength is measured by how many tons of pressure a vehicle can withstand during collision. Below is a table that identifies the tons of pressure a vehicle is supposed to withstand for the U.S., Germany, and Japan:

Table 7 – Tons of Pressure (Buff Strength)[49][50]

Regulatory Entity	Tons of Pressure
FRA	940 tons (locomotive) 360 tons (coach)
UIC	200 tons
MTSR	100 tons

The FRA regulation is developed so that rolling stock can withstand an impact of 360 tons without permanent deformation for occupied passenger cars (945 tons for the locomotive), the UIC regulation requires 200 tons, while the MTSR of Japan does not require a specific figure, Japanese rolling stock is usually constructed to withstand 100 tons. The major difference in buff strength requirements can be attributed to two different philosophies of passenger rail operations. The FRA philosophy is to assume that a collision will occur, so the bulkier and heavier the train is, the better to withstand a collision. The UIC and Japanese philosophy is to try and avoid collisions altogether by not focusing on weight, which will make the vehicles too heavy to efficiently operate, but rather the "overall rail system, i.e. signaling system, track design, operation systems".[51] UIC regulations have been developed over time through coordination among national rail regulators and by conducting tests to improve overall performance. The long-standing policy of Japan's MTSR has been that crash avoidance is the best policy. However, initial research by the Japanese government has shown that when accidents do occur, crashworthiness standards can be effective in reducing passenger injuries and casualties and modification of existing requirements may be required.[52] FRA regulations were developed by the U.S. Railway Post Office in the 1920's and the only update to those regulations has been a doubling of the buff strength regulation to current requirements.[53] There are two major drawbacks that have resulted from this outdated FRA buff strength requirement when compared to the UIC and MTSR requirements.

Negative Result #1

The first negative outcome of the FRA buff strength requirement is that all rolling stock assembled for U.S. operation is inordinately heavy as compared to the rolling stock operating in Germany and Japan. The excessive weight of U.S. trains leads to increased power consumption, slower acceleration and deceleration, an increase in maintenance costs for right-of-way infrastructure, and slower operating speeds on curved segment of track. Below is a table that provides examples of high-speed trains in Japan, Germany, and the U.S. and the associated weight per passenger (total weight/passenger seats).

Table 8 – Examples of Rolling Stock Weight:[54]

Train Series	Tons per passenger
N700-I Series Shinkansen[55] (JR)	.54
Siemens Velaro (ICE 3) (DB)	.97
Bombardier-Alstom Acela (Amtrak)	1.86

Excessive buff strength regulations in the U.S. require trains to be manufactured that are two to nearly four times heavier than those operating in Germany and Japan. Excessive weight of rolling stock leads to a reduction in operating speeds, which is especially true with regard to the speed at which a train can traverse track curves. Lighter trains can accelerate and decelerate faster and in addition to the speed at which trains can traverse curves, can have a significant impact on travel times. Lighter trains mean less investment is required to modify existing rail infrastructure to accommodate the ability for heavier trains to travel at higher speed. In addition, heavier trains increase the wear and tear on infrastructure and require an increase in maintenance budgets.

By lowering the buff strength requirement in the U.S. to that of the UIC or MTSR regulation, the investment required to improve infrastructure to accommodate higher speed for heavier trains can be redirected to additional passenger rail projects and in turn improve the national passenger rail network. Higher speed trains that reach a larger number of urban areas not only increases ridership, but leads to a more effective and efficient national passenger rail network that can better compete with air and auto travel. Increased competition among transportation modes can lead to a reduction in congestion and increased operating efficiency among all modes.

The fundamental difference between crashworthiness regulations as developed by the FRA, compared to the requirements in Germany (UIC) and in Japan (MTSR), is that the UIC and MTSR focus on technology, design, and operating procedures rather than brute strength. The UIC and MTSR regulations focus on the avoidance of accidents all together, rather than assuming accidents will happen, as is the case with the FRA. This is conducted in multiple ways to include, separation of freight and passenger traffic, positive train control systems, and crash energy management rolling stock design. The UIC and MTSR have found that crash energy management is a much safer and more effective process to manufacture trains, rather than simply increasing the actual buff strength requirement. The UIC and MTSR also use articulated trains, which are train cars that share trucks and lead to reduced weight and increased speed. Articulated trains are permanently connected, unlike impermanent connected cars that operate on all trains in the U.S. (accept Acela); these are connected by a coupler and can easily break during an accident. The 1993 derailment of a French TGV traveling at 182mph in France did not jackknife due to the train being articulated, rather than coupled; the incident left only one person injured.[56]

In Germany and Japan a large portion of goods are moved by freight rail, however, in both countries major passenger rail corridors are separated from those on which freight trains operate. However, in both countries, many local and regional trains operate on shared ROW. Passenger trains that operate on dedicated ROW lead to safer operation of passenger train and minimizes the threat of collision by separating the two types of systems. In addition, in Germany and Japan positive train control systems have been developed which will automatically stop a passenger or freight train should a driver bypass a stop signal or run too close to another train. A positive train control system has been mandated by the U.S. Congress under the PRIIA act in 2008, but research and implementation is still ongoing and the current implementation deadline of 2015 is likely to be extended due to the technical complications involved with the implementation of such a large-scale system.[57]

The FRA still requires FRA-compliant rolling stock on the Northeast Corridor in the U.S. (the U.S.'s only high-speed line) where freight trains are infrequent and can only operate by coordinating with Amtrak and local commuter railroads; Amtrak and local state transportation departments own the track and have operational priority. Beginning in 2005, Caltrain (the commuter rail between San Francisco and the Santa Clara Valley) conducted extensive testing of UIC compliant equipment in order to request an FRA buff strength waiver. The results showed that FRA buff strength requirements only provided additional protection between the speeds of 15 – 25 mph; 25mph and above showed no difference in injury to passengers.[58] This Caltrain waiver request completely negates any validity to FRA buff strength requirements. When comparing this information, it becomes quite clear that the German and Japanese regulations which focus on accident avoidance, crash energy management, positive train control and passenger and freight traffic separation and not excessive buff strength requirements are the more effective, efficient, and safe passenger rail regulations.

Negative Result #2

The second negative result of the FRA crashworthiness standards as compared to UIC and MTSR regulations is cost associated with procurement. FRA compliant rolling stock costs considerably more than those units that are UIC and MTSR compliant. Prior to the 1980's, the U.S. was the leader in rolling stock manufacturing.[59] By the 1980's however, U.S. rolling stock manufacturers had gone bankrupt due to three decades of government policies geared toward interstate investment and homeownership in the suburbs. These government policies combined with cheap gasoline, continued increases in private automobile ownership, the middle class moving to the suburbs, and government subsidies to air travel led to the decline in passenger rail ridership. By the early 1970's, nearly all-private passenger rail companies in the U.S. had gone out of business, and domestic manufacturing managed to limp along for another decade eventually going under. Even with the creation of the government subsidized Amtrak, the level of national investment in passenger rail was insufficient to maintain domestic manufacturing. Around this same period German and other European rail manufacturers began to rebound through renewed public investment in passenger rail by national rail operators and governments. The same case is true of Japan in the early 1960's, and again with the initiation of privatization in the 1980's

The increased investment in German and Japanese passenger rail led to a revival in research and development and the manufacturing of modern high-speed rolling stock. U.S. investment in rolling stock has been minimal compared to other countries and was nowhere near the level to sustain domestic manufacturing. Because of the lack of investment in the U.S. and the significant investments in Germany and Japan, all new rolling stock was built to either UIC or MTSR technical specifications. When German and Japanese companies purchase rolling stock, they are able to purchase "off-the-shelf" type equipment. In addition, because of the high level of investment in Germany and Japan, and the off-the-shelf purchase of rolling stock, bid prices by manufacturers are much lower than those provided to U.S. operators purchasing rolling stock.

When U.S. commuter rail agencies or Amtrak wishes to purchase new rolling stock, all of it must be specially designed to meet FRA specifications and cannot be purchased off-the-shelf. This is for two reasons: 1) all rolling stock is built to UIC and

MTSR specifications, and 2) U.S. investment is very low and sporadic that it cannot support a sustained demand for new rolling stock; this makes every order a special order. Below are a few examples of relatively recent Amtrak FRA-compliant locomotive purchases compared to the equivalent UIC-compliant and MTSR compliant off-the-shelf price:

Table 9 – Rolling Stock Purchase Price Per Unit

Train Series	Total Units	Total Price	Price per Unit
[60]Shinkansen N700 (JR)	232	$1B	$4.39M
[61]Alstom Coradia Lint DMUs (DB)	38	$196.6M (€160M)	$5.18M
[62]Siemens “Cities Sprinter” ACS64 (Amtrak)	70	$466M	$6.65M

As you can see from the examples above, the Amtrak purchase is 28% higher per unit than the German UIC compliant purchase and is a whopping 51% higher than the Japanese MTSR compliant purchase. What these purchase prices show are that U.S. purchases come with a premium price per unit due to the specification requirements and lack of overall quantity ordered.

Regulation #2: Cant Deficiency and Super Elevation

The second area of regulation that differs widely between the U.S., Germany, and Japan is the maximum allowable level of super elevation and cant deficiency. Super elevation is the term used to describe the level of banking on a curved section of track. The higher the degree of banking, the faster the train can traverse the curve. The level of super elevation is the number of inches higher the outside rail is compared to the inside rail on a curve. When tracks are super elevated, there is a speed in which a train travels through the curve and the weight is evenly distributed between the two rails; this is known as camber. When the speed of a train is higher than the camber speed, pressure is applied to the outside track and is known as cant deficiency. When you combine both cant deficiency and super elevation it is known as unbalanced super elevation. The higher the level of unbalanced super elevation, the faster a train can traverse corners and in turn increase the trains average speed and decreases overall trip time. There is of course a limit to the level of allowed unbalanced super elevation and that correlates to the comfort of passengers on the train. Train sets have tilting capability, which increases the amount of camber in the passenger car and allows for a more comfortable ride through curves. Another particularly important element that may limit the level of allowed super elevation and that is whether or not freight rail operates on the track. Because freight rail operates at much slower speeds, carries heavier loads, and stops more often than passenger rail cars, the allowable level of super elevation can be no more than the maximum a freight train can handle without tilting over on a curve while at a stop. Freight trains also increase wear and tear, increasing rail maintenance costs when ROW curves are super elevated.

The following table compares the maximum allowable level of super elevation and cant deficiency, combined known as unbalanced super-elevation, for non-tilting and tilting trains in the U.S., Germany and Japan:[63][64]

Table 10 – Unbalanced Super Elevation

Train Type (Country)	Unbalanced Super Elevation
Commuter Rail - non-tilting (U.S.)	3” Total
Acela High-speed - tilting (U.S.)	7” Total
Regional Rail – non-tilting (Germany)	7” Total
*High-speed - tilting (Germany)	12” Total
Regional Rail – non-tilting (Japan)	7” Total
Shinkansen High-Speed - tilting (Japan)	11.8” Total

* Current maximum in use in Europe is the Pendolino, which operates at 11.8”.

There are three reasons that allowable levels of unbalanced super elevation are much lower in the U.S. than Germany or Japan. First, the overall weight of the rolling stock is much higher than that of trains operating in Germany and Japan. This leads to longer curve radius requirements in the U.S. should an unbalanced super elevation of 11” or 12” ever wish to be achieved. Due to the lack of investment in ROW across the U.S., track geometry has not been significantly altered or improved to increase speeds over the course of the twentieth century. Therefore, heavier trains are operating on tighter curves, reducing overall speed. The second reason why unbalanced super elevation is much lower in the U.S., is that freight trains continue to operate on almost all passenger rail lines in the U.S., reducing the level of allowable super elevation. The third reason is that the current allowable FRA level of super elevation is based on a single passenger comfort test that was undertaken by the New York, New Haven, and Hartford Railroad in the 1950’s, which led to the current 3” standard.[65] “This [result] does not mean…different test methods [were used in the U.S.] than in Europe.”[66] “The carriage that was tested had a rather soft suspension, and tilted to the outside of the curve resulting in an uncomfortable ride."[67] This single test was subsequently written into regulation and is still in place today.[68] While the UIC and MTSR conducted additional technical analysis and updated regulations to reflect technological advances over the subsequent decades, the FRA continues to base all future changes off a single flawed test from the 1950's.

Negative Result

The negative result from a low level of allowable unbalanced super elevation is significant. The higher the unbalanced super elevation, the faster a train can traverse curves, reducing overall trip time. In addition, less investment will be required to strengthen or increase track curvature, saving million of dollars in infrastructure investments. A particularly important example of this is Amtrak's Acela express that runs between Boston and Washington D.C. If the Acela could operate at an unbalanced super elevation of 11", the same as in Germany and Japan, it would shave more than twenty minutes off the current run-time between Boston and New York of 3 hours 35 minutes.[69] A 20+ minute reduction in trip time would substantially increase already high ridership levels, and save billions of dollars in infrastructure investments. The cost required to reduce current travel time by just 15 minutes between Boston and New York, without increasing unbalanced super elevation is nearly $4 billion.[70]

As the data shows, regulatory structure, and specific regulations can have serious impacts with regard to overall investment, ridership levels, and congestion.

CHAPTER 6

INVESTMENT, RIDERSHIP & CONGESTION

The research thus far has shown that administrative and regulatory structures differ substantially between the U.S., Germany, and Japan. The research has also shown that administrative structures may have an impact on investment, ridership, and congestion, while regulatory structures, and specific regulations clearly have an impact.

The following section will highlight how administrative and regulatory structures, and specific regulations can have an effect on the levels of infrastructure investment, ridership, and national automobile congestion.

Investment

Comparing levels of national passenger rail investment across countries can be difficult, due to the lack of easily accessible public information. The scarcity of such information is compounded by the multiple companies and government agencies responsible for both operations and infrastructure. The information provided covers all national infrastructure investments for a period of one year.

In the U.S., investment in passenger rail operations and infrastructure comes from both the state and federal government, while the private freight rail industry covers the majority of infrastructure investments in the form of ROW.

In Japan, investments are a mix between public and private, due to the bifurcation of the national system. Half of the national passenger rail system is owned, operated, and maintained by the private sector, while the other half of the system is maintained and operated by the government.

In Germany, nearly all infrastructure and operational investments are publicly funded. The following table shows all infrastructure investment (rolling stock procurement & operations excluded) by country for 2008:

Table 11 – Infrastructure Investment

Country	Infrastructure Investment per $1,000 of GDP (2008)
United States (all public transit)[71]	.78
Germany[72]	$1.50
Japan (5 of 6 JR Companies)[73][74][75][76][77]	$2.42

As the table shows, the U.S. spends approximately half of what Germany spends in infrastructure annually and the U.S. figure includes all public transit investment, not just passenger rail investment; public transit investment makes up the majority of value of the figure in the table. If all freight rail infrastructure investment is included, the figure rises to $1.40.[78] Only 21% of all national rail infrastructure kilometers are used for passenger rail use and in most cases passenger rail trips are infrequent (two trips per day) and are considered a secondary use.

The German level of infrastructure investment is substantial and is quite impressive considering all of the funding is from the federal and state governments. Even with the substantial governmental investments in Germany, Japanese infrastructure outpaces that of Germany and far exceeds U.S. investment levels.

Japanese investment data was derived from five of the six passenger rail operators, to include all three private operators and two of the three public operators. While there are additional private passenger rail operators in Japan, the JR Group of companies represents the largest operators that provide the most sufficient levels of infrastructure investment. The Japanese investment levels more than triple that of the U.S. and are just over 60% higher than Germany.

The comparison of national infrastructure investment levels reveal that Japan is the most willing to commit significant amounts of capital in order to create an effective national passenger rail system. Germany is not too far behind Japan, but clearly does not have the same voracity for passenger rail investment as Japan. U.S. investment levels are very small in comparison to German and Japan and are actually even smaller than the figure of .78 per $1,000 dollars of GDP, because the .78 includes all levels of public transit investment and not just that of passenger rail.

Ridership

As referenced previously, there are many types of passenger rail systems. For this analysis, the information provided includes only intercity and regional/commuter type passenger rail systems. Ridership statistics are a useful measure to indicate overall popularity of the national system and can help provide additional information relating to the success of specific policies and investments.

In the U.S., the only intercity passenger rail carrier is Amtrak, while there are 28 separate commuter rail type systems in operation. In Germany, data includes only that of the national carrier DB AG, due to the fact that DB AG is the state funded national operator and is the major operator of intercity and regional commuter trains. In Japan, data is used from five of the six JR companies, which represent the major intercity and regional systems across the country. Below are ridership levels for 2011:

Table 12 – Ridership

Country	Systems	Ridership (2011)	% Difference
United States	Amtrak[79]	30.2M	-
	Commuter Rail Systems (28)[80]	464.2M	
	Total	**494.4M**	
Germany	DB AG Only[81]	1.9B	284% higher than the U.S.
Japan	JR Companies Only (5)[82]	8.8B	1,681% higher than the U.S.

The difference in national passenger rail ridership between countries is significant. The data for the U.S. includes all forms of passenger rail, which encompasses both Amtrak and the 28 regional commuter rail systems, which mainly serve as daily commuter service to larger metropolitan areas.

German ridership data would be several hundred million higher if all non DB AG ridership data was included such as all non DB AG operated regional rail systems, usually referred to as S-Bahn or R-Bahn regional services. German annual ridership is nearly 300% higher than U.S. ridership.

Japanese ridership data only includes five of the six JR companies. If all other private passenger rail operators were included, the annual ridership number would almost double (excluding privately held subway ridership figures).[83] Japanese ridership is more than 1,600% higher than ridership in the U.S., and four and a half times higher than Japanese ridership.

When combining annual ridership and infrastructure investment statistics, the U.S. comes in last in both places, Germany in the middle, and Japan not only spends the most but also has the highest level of ridership.

Congestion

Automobile congestion statistics are a good source of data to draw conclusions from regarding the modal split of urban and national transportation systems. By looking at both population and annual hours wasted in congestion per person, the type of national modal policy priority can be better understood for a particular country or region.

The data used for the U.S., Germany, and Japan includes statistics for the five largest metropolitan areas in each country. Data by metropolitan area has been delineated by population and time wasted in congestion annually per person; are national statistics are also included.

In the U.S. and Germany data includes metropolitan area statistics for both population and time wasted in congestion. In Japan, metropolitan area population statistics were used, but congestion data by metropolitan area was unavailable. Japanese data for congestion is derived from statistics from individual prefectures. In all cases, the prefecture is either smaller and has a higher population density than the metropolitan area or constitutes the entire metropolitan area. With this in mind, statistics provided for time wasted in congestion for Japan err on the conservative side by using statistics for a more densely populated area than the entire metropolitan area, likely leading to a higher number of hours wasted in congestion. The table below represents the findings for both population and time wasted in congestion in all three countries:

Table 13 – Hours Wasted in Congestion Annually

Largest Metropolitan Areas	Pop. By Metro Area (2010)[84][85][86]	Auto Time Wasted in Congestion (Hrs. – Annually/per person – 2010)[87][88]
United States		
New York	18.90M	71.5 hrs.
Los Angeles	12.83M	81.6 hrs.
Chicago	9.46M	52.3 hrs.
Dallas – Fort Worth	6.37M	30.4 hrs.
Houston	5.95M	32.4 hrs.
National Totals	**308.75M**	**19.8 hrs.**
Germany		
Rhein-Ruhr	13.3M	66.9 hrs.
Rhein-Main	5.3M	41.7 hrs.
Berlin	4.5M	29.1 hrs.
Munich	4.3M	54.8 hrs.
Stuttgart	3.6M	66.0 hrs.
National Totals	**82.00M**	**45.6 hrs.**
Japan		
Kanto (Tokyo)	35.68M (2005)	^30.6 hrs.
Keihanshin (Osaka)	18.77M (2005)	^30.6 hrs.
Chukyo (Nagoya)	8.92M (2005)	^39.0 hrs.
Kitakyushi – Fukuoka (Fukuoka)	5.59M (2005)	^26.6 hrs.
*Sapporo (Ishikari)	2.60M (2005)	-
National Totals	**128.06M**	**30 hrs.**

^ Central city prefecture used, metropolitan area statistics not available (Data from 2006)
* Congestion information not available

As you can see from the data in the table, congestion levels differ widely between countries and between populations of metropolitan areas. First, let's look at national congestion levels: Germany has the highest national level of congestion, Japan is second, and the U.S. is third. If you simply used these statistics, it would appear that the U.S. has the least congested automobile transportation system and that passenger rail policy, regulation, investment, and ridership does not create an adverse effect on congestion levels. However, country size (in sq. km.) differs drastically and while the U.S. may have the lowest congestion levels nationally, it has the highest and second highest by metropolitan area, with Germany and the U.S. taking the top seven spots of fifteen total; Japan's five largest metropolitan areas are all in the bottom half of the metropolitan area congestion comparison.

In addition, it is important to look at total population by metropolitan area when compared to time wasted in congestion. The Kanto region in Japan has the largest metropolitan population of all fifteen areas, yet has the fourth lowest level of congestion. In the U.S., the Dallas – Fort Worth, and Houston metropolitan areas have populations that are one-sixth the size of Kanto, yet hours wasted in congestion is nearly identical. In the New York metropolitan area, the largest in the U.S., population is half that of the Kanto region, yet hours wasted in congestion is more than double the thirty hours annual in Kanto.

While the U.S. and Japan fall on opposite ends of the congestion spectrum, Germany falls somewhere in the middle. German congestion statistics mirror some metropolitan regions of Japan with population and congestion hours, such as Berlin and Kitakyushi-Fukuoka. Some German congestion statistics mirror U.S. metropolitan areas as well, such as Rhein-Ruhr and Los Angeles, which have similar populations with very high levels of congestion.

The comparison of congestion statistics mirrors that of both levels of infrastructure investment, and ridership. Japan has the largest level of infrastructure investment, the highest levels of national passenger rail ridership, and the lowest levels of hours wasted in auto congestion per person. The U.S. on the other hand has the lowest level of investment, the lowest ridership statistics, and the highest levels of congestion. Germany in all three cases falls in the middle of each statistic.

The Connection Between Structure, Regulations, and the Data

The administrative structures in each country appear to show different steps of progress in the movement toward achieving the most efficient and effective passenger rail system. Through the first half of the twentieth century, the U.S. had a robust and popular fully privatized (type four) system, which slowly saw ridership and investment decrease, while auto congestion increased over time. The U.S. is now a type one system, where freight railroads own and maintain the ROW and do so with a disregard for passenger rail service.

Germany on the other hand, has a type two administrative structure in which both the ROW is owned and maintained by the public, while operations are undertaken by the publicly owned DB AG. German investment, and ridership levels are much higher than that of the U.S., but auto congestion does not appear to be much higher in Germany than the U.S. While Germany is currently a type two system, EU directives require that not only the Germany system, but all EU countries move to a type three system in which ROW is owned and maintained by a public entity, which sells operating slots to operators. While many of the operators will be publicly owned, they will function much like a private company due to the increased cross-border competition from other operators. Private operators will also be competing directly against the public operators, and this could increase ridership further, drive the demand for increased infrastructure investment, and possibly reduce auto congestion.

In Japan, a large portion of the system has moved from a type two, publicly owned system, to one that is fully privatized (type four). The ridership and investment levels of the Japanese passenger rail system dwarf that of the U.S. and Japan, while traffic congestion is substantially lower in the largest metropolitan areas.

What these administrative structures appear to show is that the closer you move toward a fully privatized system, the higher your ridership, and investment levels will increase, while auto congestion will decrease. This of course does not mean each country should immediately privatize the entire passenger rail network. Instead, as the example of Japan has shown and as Germany begins to implement EU directives, a country must move toward a fully privatized system in a systematic process. A country cannot move from one step to the next until sufficient investments have been made, and ridership continues to increase, showing future demand.

Specific examples of the connection between regulatory structure, specific regulations, investment, ridership, and auto congestion have already been provided to include the procurement of pricier rolling stock, longer trip times, and the need for higher levels of ROW investment in order to accommodate heavier train sets operating at higher speeds. All of these examples lead to higher investment needs, reduced ridership and pricier procurements.

CHAPTER 7

CONCLUSIONS & RECOMMENDATIONS

This paper provides data and analysis with regard to the national passenger rail policies of the U.S., Germany, and Japan. These countries constitute the largest free market national economies in North America, Europe, and Asia. By spreading the selection of countries across three continents, a wide range of policies with which to compare is provided. The countries with the largest free market economies on each of these continents are selected in order to provide a similar level of comparison with regard to overall national transportation needs.

The specific policies and data that was analyzed includes the national passenger rail administrative structures of each country, the regulatory structure, regulation development, specifics regulations, and the role a non-governmental agency can play in the establishment of global standardized regulatory processes and policies. These policies and regulations were then analyzed in conjunction with the investment, ridership, and automobile congestion for each country. Several conclusions and recommendations can be reached from the policies, regulations, and data analyzed.

Conclusion – Administrative Structure

The administrative structure in the U.S. appears to be the most unlikely to support an efficient and effective national passenger rail system. All privately owned railroads in the U.S. only operate freight service and therefore all ROW infrastructure is geared toward the movement of freight traffic. This conclusion is backed up by the low percentage of national ROW used for passenger service. With passenger rail operations conducted by a public entity, over the ROW maintained for freight traffic, it is unlikely that passenger service can provide efficient and effective service. The priority of slow moving freight trains, over low speed infrastructure, results in slow passenger service with consistent delays. Slow and inadequate passenger service will not increase ridership or reduce auto congestion. In addition, since the ROW is owned and maintained by private railroads operating freight only systems, significant levels of investment in passenger rail infrastructure cannot be expected.

The type two system is the perfect structure to provide a fully functioning national passenger rail system. The type two structure accurately reflects the national passenger rail priorities of any country, and the level of public support for passenger rail can be seen by the type and level of service provided. When comparing the type one system in the U.S., to the type two system in Germany, the total ROW used for passenger service as a percentage of total ROW is 3.7 larger in Germany than the U.S, as shown in table 5. This statistic shows that the public system in Germany provides a much larger route network across the country than that provided in the U.S. Of course, in order for a type two system to be successful, it must receive an adequate level of investment. Without the required investment level, ridership will surely decrease over time, as services begin to be cut and the system falls into a state of disrepair.

While no country in this analysis currently operates a type three system, the EU directives have required that all national passenger rail agencies split the infrastructure and operations arms of their respective national systems. This directive is leading to an increase in competition and providing access to private companies to begin privately funded passenger rail service on publicly owned and maintained infrastructure. While the type one system can be seen as highly ineffective and inefficient, the type two system is needed to create a robust national passenger rail system, while the type three system seeks to create a more competitive and efficient system. By introducing competition on the operational level from private companies, while keeping the ROW in public hands, the type three system ensures public passenger rail priorities are met while reaping efficiencies from operations. The publicly owned ROW is maintained at a level to meet the needs of the type of service provided and is open to all operators should they choose to operate such a service. This method removes the monopolistic operations of a state run passenger operations company and moves it to a competitive realm that forces each company to the best service in order to attract the most passengers. The type three system increases investment from both the public and private spheres, while at the same time increasing ridership through reduced ticket prices, and increased service options via a competitive marketplace. As the system continues to grow, investment and ridership will increase as auto congestion may decrease.

The type four system is currently in use in Japan by half of the Japan Railway Group, which provides the vast majority of passenger rail service. Of the three countries analyzed, the majority fully privatized system of Japan has the highest ridership and investment levels by far. Hours wasted annually in auto congestion in Japan ranks near the bottom of the list of the fifteen metropolitan areas reviewed. While national ROW used for passenger service is not nearly as high as Germany, it is 2.2 times larger than the U.S. The fully privatized passenger rail system appears to be the pinnacle of system efficiency and effectiveness. What is important to note about Japan is that half of the JR companies are still publicly owned, but with the long-term goal of privatization. However, this movement towards full privatization is not possible without significant and sustained public investments provided over several decades. This prolonged support allows for a high performing system that is able to build ridership over time.

Conclusion – Regulatory Structure & Regulations

As stated, there are two types of regulatory structures. The first structure, a type one, entails a single government agency taking the lead for the development, adoption, and oversight of regulations. While this agency may receive input from non-governmental agencies for the development of regulations, it is provided more as supplemental input rather than a necessary aspect of the development process.

The second type of system functions in a way in which a non-governmental agency works together, as en equal partner, with the governmental agency to develop regulations. The type two system of regulatory development is the process used in Germany and Europe. This process consists of the UIC working with national and supra-national (ERA) bodies to develop regulations. In Japan and the U.S., the type one system is used, but is conducted in very different ways. In both cases and in all countries, the adoption and oversight of regulations are conducted by government agencies.

While both the type one and type two system may represent an effective way to develop passenger rail regulations to ensure safety, security, and industry promotion, historical precedent plays a major role in how regulations are developed and the final outcomes of regulatory changes. For example, the type one process in Japan is undertaken in a manner in which broad based regulations are proposed to ensure minimal levels of safety and security for passengers. Input is then received from ROW owners and private operators with regard to changes that may be required. When the regulations are adopted, all operators and ROW owners must adhere to the regulations but are allowed to operate service in any manner, so long as the overarching safety measure is achieved. This system has worked extremely well for Japan, as the entire national system did not experience a serious passenger rail crash for 42 years.[89]

The type two system in Europe is also an effective process to develop regulations. With the role that the UIC plays in the development of regulations, not only are safety and security the goal of developing regulations, but industry promotion is key as well. This approach ensures industry best practices are brought to the table by technical experts from both operators and infrastructure owners in each member country. These regulations are then reviewed and analyzed by both national regulatory agencies, and the EU's regulatory arm, the ERA. This collaborative approach is particularly effective in brining multiple opinions and a diverse array of technical expertise to the table to ensure that regulations are not too burdensome, outdated, or detrimental to safety, security and the success of each national passenger rail system.

The U.S. develops regulations under the type one structure, but through a different process than Japan. Instead of a broad, overarching regulation, very specific regulations are adopted for any particular technical measure and these must be adhered to by all passenger rail operators. The FRA develops regulations with input from non-governmental organizations, but this is not conducted in a collaborative manner. The FRA regulatory development process has begun to change slightly, but both non-governmental agencies and the FRA continue to use the existing regulations as a framework on which to make improvements, rather than revisiting all regulations to determine the validity of such regulations to begin with.

The approach undertaken in the U.S., compared to that of Germany and Japan is detrimental to the efficiency and effectiveness of the national passenger rail system and has serious negative effects on investment, ridership, and likely auto congestion as well.

Such negative outcomes of U.S. regulations include the increased cost of procuring rolling stock due to an insufficient level of consistent investment and the inability to procure off-the-shelf equipment. Additional negative outcomes include slower acceleration and deceleration, and slower speeds while traversing track curvature, significantly affecting trip time. Further detrimental outcomes include the need to provide a higher level of investment to upgrade existing infrastructure in order for the heavier and slower FRA compliant rolling stock to be able to traverse track segments at a higher speed.

The U.S. administrative and regulatory structure represents a catch-22. FRA regulations require significantly increased levels of investment in order to improve the efficiency and effectiveness of the national passenger rail system, yet the administrative structure has created a system in which significant investment levels are not possible. Significant investment levels are not possible due to the private ownership of ROW, for which freight trains take priority. To prove that significant investment is possible for transportation infrastructure in the U.S., all one must do is look at investment in the interstate system and the national aviation system. Both the interstate and airport systems are publicly owned transportation networks, on which nearly all operations are undertaken by private entities. Total federal Amtrak expenditures since 1971 are $39.3 billion, while the federal Highway Trust Fund received $53.3 billion since 2008 to fund just the shortfall in expenditures versus collected gas tax revenue.[90] Funding for the Federal Aviation Administration (FAA) is approximately $16 - $17 billion, which includes aid to airports and the funding of the national air traffic control system.[91] The actual funding figure for the aviation system is much higher, as nearly all airports are state owned, operated, and funded. The U.S. passenger rail regulatory structure and the associated regulations are detrimental to investment, ridership, and likely auto congestion.

Recommendation One – Progress Toward An Improved Administrative Structure

Of the four types of systems analyzed, the type four structure is the most efficient and effective administrative structure for a national passenger rail system. Of the countries analyzed, the level of investment, and ridership for the Japanese (majority type four) is significantly higher than the U.S. (type one), and Germany (type two). What the data appears to indicate is that each type of administrative structure is a step and each country should continue to advance the national passenger rail administrative structure one step at a time. As a country progress up the steps, ridership levels increase, investment levels increase, and finally auto congestion decreases.

However, a country cannot move from a type one system to a type four system immediately. Because it is a step-by-step process, a country must progress slowly and steadily towards achieving the ultimate goal of a type four administrative structure. The step-by-step process should take decades to achieve. As an example, Japan began the privatization process of the publicly funded JNR in 1987, and twenty-six years later half of the JR group remains under public ownership.

The incremental approach undertaken by the Japanese is the ideal way for a country to move forward. This process involves identifying certain sections of a national system that are either geographically similar or revolve around a group of cities, and then breaking that section off as an operating division. This is a process that can be undertaken in the U.S.; the Northeast and the Midwest are perfect examples of individual operating sections. This process can be divided even further, by identifying a central corridor in each section that would be the most likely to be successful under private ownership or private operations, leaving feeder routes under the public realm. Examples of central corridors include the Northeast corridor in the Northeast, and the route between Minneapolis and Chicago, via Milwaukee in the Midwest.

The incremental approach for improving the administrative structure of a national system cannot begin without a period of substantial investment, sustained over a long period of time. The Japanese system was under public control and received high levels of investment for decades. The same investment situation is true of passenger rail in Germany, although the German system is not as far along as Japan due to German reunification in the early 1990s. In order for the U.S. to move to a type two administrative structure, significant investment would be required to purchase and upgrade ROW that is currently owned by private freight operators. This can be achieved, and would likely be most successful if conducted on a corridor-by-corridor basis.

While the type four structure is the most efficient and effective administrative structure, some countries may not wish to create a fully privatized system. Some counties may be too small geographically or lack the population to support the ridership levels required for a fully privatized system. Other countries may wish to control ticket prices and therefore do not with to have ticket prices set by a private operator. So while every country may not be able or even desire to reach the goal of a fully privatized national system, certain characteristics of a type four structure are desirable, such as significant investment, high ridership, and the possibility of reducing auto congestion.

Recommendation Two – Establish a Non-Governmental Regulatory Body

A non-governmental regulatory body should be established to standardize the regulatory development process, and standardize safety and security regulations, which will lead to improved national policies and economies of scale. Since a non-governmental body already exists (the UIC), a new one does not need to be created; rather the existing membership of the UIC can be expanded. This can be achieved in countries like Japan and the U.S., by making the FRA, MTSR, Amtrak, all divisions of the JR Group and other operators become full-members of the UIC. Achievements can begin by simply working within the UIC and other member countries to compare regulations and begin the discussion process as to why one set of regulations might be more effective than what is currently in place.

Over time national policies may change based on UIC recommendations and the sharing of best practices internationally, leading to safer and more secure national passenger rail systems. These changes will likely lead to an increase in ridership in the U.S. and a reduction in auto congestion in some corridors where passenger rail is well situated for substantial growth. The utilization of best practices may also lead some countries to somewhat alter or even completely reform existing regulations, which will creates economies of scale with regard to the manufacture of rolling stock. The less specificity of each countries rolling stock requirements will lead to the creation of a manufacturing process that focuses on slight modifications to off-the-shelf products, rather than a complete redesign for each countries purchase. A movement toward off-the-shelf products will greatly reduce production costs for manufacturers, who will pass on the savings to the purchasing country. While the standardization of the regulatory process and associated regulations is only necessary for passenger operations for countries that border one another, the savings gained from procuring standardized equipment will have a global effect.

Standardizing the regulatory process and associated regulations has already been achieved on the global scale through the both the ISO and ICAO. The ICAO has helped implement policies to create an efficient and effective global aviation system. The same can be said of the ISO, with such examples including the standardization of shipping container size. Supporters of such organizations as ISO "believe that its openness, as well as its aim of achieving solutions that are "scientific" or "technical" rather than "political", assures the legitimacy of the resulting standards, and, hence, their widespread adoption."[92] The same result for shipping and aviation can be achieved for passenger rail.

Final Conclusion

The analysis has shown that national passenger rail policies have an effect on ridership and investment. Policies may have an effect on auto congestion, but the link between policies and congestion is not as strong as the link between that of national policies and ridership and investment. Investment and ridership levels differ drastically between the U.S., Germany, and Japan, while congestion data is somewhat similar in the U.S. and Germany, with Japan as the only country showing a significant difference.

There are likely additional factors that have an effect on national passenger rail investment and ridership, as well as auto congestion. Such factors may include the population density of cities, ridership and investment in subway and bus systems, and the public and private investment in other modes of travel. However, the data and analysis provided show stark contrasts between each country and provide specific examples of regulations and structural issues that directly effect investment, ridership, and likely auto congestion as well. While administrative and regulatory policies might not tell the whole story with regard to national passenger rail investment, ridership, and auto congestion, they do represent a key component of the data.

The Japanese system stood out as the leading national passenger rail system, and the U.S. stood out as the least effective. However, each system can use improvements and this can be achieved through global standardized regulatory processes and policies, developed by a non-governmental body such as the UIC. The standardization of process and policies can improve the efficiency and effectiveness of national passenger rail systems, by moving people faster, more often, safer, more secure, and cheaper.

A multi-modal national transportation system is a critical component of any countries long-term economic sustainability. A national transportation system that prioritizes one or two modes over others leads to system-wide inefficiencies, including lost wages, wasted fuel, and the loss of productive work hours. We live in a global economy and competition between countries is fierce. A national passenger rail system that is well managed, within an effective administrative structure, and with sensible regulations, can increase investment levels, ridership, and likely reduce auto congestion. This outcome can lead to increased economic growth and may give one country a competitive advantage over another.

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