



Investigation of Rail Accidents - International Comparison Summary in English

This is a summary of the master's thesis by Mr. Kai Valonen. The original master's thesis is in Finnish and it is available at the web site of the Accident Investigation Board of Finland (www.onnettomuustutkinta.fi/5745.htm).

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ABSTRACT

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This thesis deals with the investigation of rail accidents in different countries. The study was needed because there is not much information available about rail accident investigations. As far is known, no similar overviews of this subject have previously been made.

In many countries in Europe and other continents the railways are undergoing changes. In many countries, for example, the state railways are being separated from the state and incorporated, and further subdivided into different organisations. At the same time new competing enterprises are entering the branch. When the railways begin to function in accordance with the laws of market economy, close attention should be paid to ensuring safety. Therefore, an independent and reliable accident investigation organisation should be set up in connection with organisational restructuring. Such a new organisation could also investigate the possible role of the railway administration in accidents.

In the present thesis the arrangements for accident investigations in 20 countries are presented. At the present, rail accident investigations in many countries are quite undeveloped. This usually becomes evident from the fact that the railway administration or operator itself conducts such investigations. In some countries, furthermore, the investigations are too closely connected with legal proceedings instituted on the basis of the accident. Accordingly, the objective of increasing safety is obscured by questions of guilt and indemnification.

The thesis also deals with how the organisations of different countries cooperate with one another. This was compared with the cooperation among aircraft and marine investigators, which are known to be well-organised. The thesis concludes that there is hardly any cooperation in the investigation of rail accidents. For example, there are no common investigation directive at the European Union level. The thesis considers why cooperation would be needed and how it should be developed.

One of the objectives of this thesis was to try to formulate some recommendations in order to develop the Accident Investigation Board of Finland by studying investigation procedures in other countries. The organisational arrangements of the Accident Investigation Board of Finland clearly meet the requirements of modern accident investigation. However, some recommendations for procedures in rail accident investigations are presented.

Keywords: accidents, rail accidents, train accidents, train crashes, accident investigation, Accident Investigation Board of Finland

1 INTRODUCTION

International co-operation in the investigation of aviation accidents has a long tradition. Since 1944 the International Civil Aviation Organisation ICAO has coordinated the implementation of a convention on international civil aviation that has been approved by 185 nations. Annex 13 to the convention includes standards and recommended practices for accident investigation.

Maritime operations are also internationally well organised ever since the International Maritime Organisation IMO was founded within the framework of United Nations in 1948. However, the investigation of maritime accidents has been organised internationally much later than in aviation. An organisation for maritime accident investigators was founded in 1992. In addition, in 1997 IMO published a code for maritime accident investigation, which is a recommendation for investigation practices.

Rail operations have traditionally been national, and close co-operation between nations has been rare. Therefore, the investigation of rail accidents is mostly arranged nationally. Because of the lack of international practices, only a small amount of information about rail accident investigation practices is available. The purpose of this study is to chart the state of rail accident investigation in different countries.

The timing for this study is opportune since railways in many countries are currently in a transitional stage as the former national railways are being incorporated and subdivided into different organisations. At the same time, discussions about opening the rails for open competition have been going on. When the railways begin to function according to the laws of market economy, close attention should be paid to ensuring safety.

To maintain and develop safety in railways, every country should have a credible organisation for rail accident investigation. The organisation should be independent from rail authorities because the investigation should also be able to question the organisation and the regulations of authorities. To establish and develop a proper rail accident investigation organisation, it would be useful to adopt widely the methods used in the investigation of aviation accidents. In addition, when developing rail accident investigation, co-operation with similar foreign organisations would help in learning from one another's successes and mistakes. International co-operation is naturally also needed when there is frequent train traffic across borders.

2 THE PURPOSE OF RAIL ACCIDENT INVESTIGATION

Rail accidents in Finland are investigated by the investigators of the rail operator, police, health and safety authorities, insurance companies, safety technology authorities, the Accident Investigation Board and in serious cases an investigation committee appointed by the Accident Investigation Board or the Finnish government. The task of all these organisations includes finding out what really happened. However, the ultimate goal of each organisation is different.

In this study the term “accident investigation” means the investigation that is made primarily to find out: 1. What happened? 2. How did it happen? 3. Why did it happen? 4. And what can be done to prevent reoccurrence? The sole purpose of the investigations is to improve safety and therefore questions of guilt and indemnity liability are ignored.

In the first place, the purpose of accident investigation is to improve safety by learning as much as possible by investigating accidents or incidents that have occurred. During the investigation process all facts are collected, analysed and written down in a public report. The most important part of the report is the recommendations. If the measures suggested in the recommendations are carried out, similar accidents can be avoided in the future or at least their consequences can be minimised.



Figure 1. Accident investigators at work after an InterCity-train and a freight train had collided at Suonenjoki, Finland, on 12 August, 1998.

One very important purpose of accident investigation is that the people involved in the accident, their relatives and average citizens have a right to get answers to questions

such as: What really happened? What went wrong? Why did all this happen? How could we avoid similar accidents in the future?

Accident investigation can also be justified from the economical point of view. On the wall of the Accident Investigation Board of Finland there hangs an aphorism: "If you think safety is too costly, try an accident". For example, the direct costs of the DC-10 aircraft accident in Sioux City USA were over 300 million US dollars. Even more expensive was the case of the Exxon Valdez crude oil tanker. Even though nobody was hurt or killed in the accident, the oil cleaning operation cost totalled 2-3 billion US dollars.

In Finnish railways the most expensive recent accidents were the accident at Jokela in 1996 (direct costs over 4 million US dollars), in Jyväskylä in 1998 (direct costs over 3 million) and at Suonenjoki in 1998 (direct costs over 2,5 million).

Although the cost generated by accidents can be quite high, the main purpose of the accident investigation is to protect citizens from being killed or injured and to prevent environmental damage.

3 RAIL ACCIDENT INVESTIGATION IN FINLAND

Since 1950 the Finnish State Railways itself investigated rail accidents in Finland. The investigation was divided into two parts: technical causes and human factors. In most cases the technical causes were excluded only by declaring that there were no technical causes of the accident.

Since 1932 the Finnish State Railways has employed investigators, whose task is even today to clear up the role of human factors. The conclusions were delivered to the participant's superiors and, if needed, to the court.

The State Railways have produced over 200 reports on rail accidents and incidents between 1977 and 1995.

An independent commission on major accident investigation was founded within the Ministry of Justice by a law in 1986. Its task was to prepare for major accident investigation in any sector of society. This organisation published 20 reports about major accidents between 1986 and 1996. Two of the reports were about rail accidents.

In 1996 the law concerning accident investigation was extended and the Accident Investigation Board of Finland was founded. To assure that the organisation is as independent as possible, also it was located within the Ministry of Justice. The Accident Investigation Board is an independent department of the Ministry of Justice and has nothing to do with court or prosecution processes.

The task of the Accident Investigation Board is to improve safety by investigating accidents and preparing public investigation reports. The main purpose of reports is to improve safety, and therefore they should not be used for clearing up questions of guilt and indemnification.

The Accident Investigation Board has permanent personnel for rail, maritime and aviation accidents. All accidents in those transportation modes are investigated. In addition, all major accidents in any sector of society are investigated. The Accident Investigation Board has a roster containing the names of about 250 specialists for various kinds of scenarios, who will be called in when needed. When the experts are brought into an investigation by the Accident Investigation Board, their legal status becomes that of a civil servant.

The Accident Investigation Board has two full-time investigators for rail accident investigation. Their task is to investigate all accidents occurring in train traffic and all shunting accidents in which someone has been killed or seriously injured or if the accident is related to hazardous goods. Underground and tram accidents are investigated if several people have been killed or injured.

Incidents are investigated when it can be expected that the investigation may give valuable information for preventing accidents in the future. Level crossing accidents are

classified as road accidents. Therefore they are not investigated unless the train derails or someone in the train is killed or seriously injured.

Since the Accident Investigation Board investigates accidents at sea, in the air and on rails, it is called a multimodal accident investigation organisation. Although the transportation modes differ considerably from each other and the modes have their own international instructions, investigation practices have many similarities as well. Investigators of different modes interact on a daily basis. Discussions are profitable and they help each mode to find new ideas and develop their course of actions. A multimodal organisation also has benefits when the administration is the same and they all can use common equipment. It is cost effective. Moreover, the form and printing procedures of reports are developed in co-operation. However, while the structure of the final reports is defined by international agreements for aviation and maritime accidents, rail accident reports have developed during the investigation processes.

Rail accident reports include factual information, a description of rescue work, a description of investigations made, an analysis, causes of the accident and finally, recommendations. Reports are printed and delivered to everyone who might benefit from them. Reports are public and they are published on the Internet (www.onnettomuustutkinta.fi).

4 RAIL ACCIDENT INVESTIGATION IN OTHER COUNTRIES

In this study rail accident investigation organisations in 20 countries are presented. In general, it can be said that a moderate amount of information was available only from countries that have a so-called multimodal investigation organisation. Information has been acquired from the Internet, via the International Transport Safety Association (ITSA) and of course directly from the organisations. Information was readily available from the organisations that are members of the ITSA, but responses from other countries were hard to obtain. Major problems were the lack of a common language and difficulties in finding the proper person. Furthermore, general brochures about the organisations and their tasks were very seldom available in any language.

In the table below are descriptions of rail accident investigation organisations in different countries. As a summary it can be stated that the investigation is arranged best in the organisations that are internationally active. Unfortunately, in most countries the investigation is still arranged in an old-fashioned way. In those countries investigations are carried out by the railway administration or even by the operator itself. As a result conclusions may be subjective and therefore not always credible. In addition, the reports are often brief and not public. However, further investigations made by a railway administration or by operator for quality management or R&D reasons are of course also welcome, in addition to investigations made by an independent organisation.

Independent investigation organisations especially for safety reasons exist in Finland, the Netherlands, Sweden, USA, Canada, Australia, New Zealand and India. In many countries the procedures and organisational arrangements in the table below do not apply to major accidents. In case of a major accident, the government of the country often intervenes and organises the investigations.

Country	Organisation	Description
Finland	Accident Investigation Board of Finland	<ul style="list-style-type: none"> - Located within the Ministry of Justice - Investigates all accident in train traffic and all shunting accidents where someone has been killed or seriously injured - Also incidents are investigated - Investigation of aviation and maritime accidents and investigation of any major accidents in the same organisation - An investigation committee is set up for investigation of major accidents, their incidents and for investigation of some other serious accidents - Investigation reports are public and published on the Internet

Sweden	Statens haverikommission (Board of Accident Investigation)	<ul style="list-style-type: none"> - Investigates all kinds of serious accidents - Only serious rail accidents are investigated - Also incidents are investigated - Minor accidents are investigated by Järnvägsinspektionen located within Banverket (the Railway administration) - Reports are public and some of them are published on the Internet - The Haverikommission is independent (for example from the Banverket)
Norway	Jernbaneverket	<ul style="list-style-type: none"> - An investigation commission of the railway administration investigates all accidents, even major ones - Reports are not public on grounds of protection of privacy - In addition there is a separate inspection authority, the Jernbanetilsyn, that does not, however, participate in the investigations
Denmark	Jernbanetilsynet	<ul style="list-style-type: none"> - Located within the Ministry of Transport, but is separated from the railway administration (Banestyrelsen) - Main tasks are inspections, but one task is accident investigation - Incidents are investigated whenever needed - Reports are public except in some special cases - In addition to recommendations, reports can include orders
UK	HM Railway Inspectorate	<ul style="list-style-type: none"> - Located within the Health and Safety Executive (HSE) - Main tasks are inspections - Reports are public - Investigations also have a juridical motive, because investigations support court proceedings. - Investigation times are quite long because investigations follow case law - Also incidents are investigated too - A brief about developing investigation procedures has been drafted, but decisions have not been made yet.
Germany	Deutsche Bahn DB	<ul style="list-style-type: none"> - The biggest operator DB investigates all accidents that take place on their rail network (also 240 other operators run on the DB network) - In major accidents the rail administration Eisenbahn-Bundesamt (EBA) does investigations on the accident site, but they are done for court processes. - DB prepares a report about the accidents, but it is not public - However, the reports are delivered as a complete report or as a summary to EBA - The need for new investigation arrangements are obvious, because trains run across borders

France	Major accidents: CGPC, other accidents: SNCF	<ul style="list-style-type: none"> - The investigation is carried out by the state railways of France, SNCF. - The Ministry of Surface Transport makes decisions about major accident investigations. It usually orders the Road transport organisation CGPC to carry out the investigation. In that case CGPC sets up a committee of experts. - Reports are not public.
Switzerland	Juridical authorities	<ul style="list-style-type: none"> - Accident investigation is connected with court proceedings. Because of that there are also other motives for the investigation besides improving safety. - The Ministry of Transport participates in investigations only by giving expert help. - However, they try to achieve improvements in safety, because it is the duty of the Ministry of Transport to carry out all improvements that are needed according to investigations. - Operators investigate minor accidents by themselves and deliver their reports to the Ministry of Transport. - Reports are not public.
Austria	Österreichische Bundesbahnen (ÖBB)	<ul style="list-style-type: none"> - The Austrian state railways ÖBB investigates accidents. - There is no separate railway authority organisation in Austria. - The ÖBB has a central safety unit, which takes the highest responsibility for investigations. - Reports are delivered to directors of railways and to courts whenever needed. - Reports are not public.
Italy	Ferrovie dello Stato (FS)	<ul style="list-style-type: none"> - The State railways investigates accidents by itself - In addition, accidents are investigated by justice authorities
The Netherlands	Dutch transport safety board (DTSB)	<ul style="list-style-type: none"> - The DTSB investigates all cases that have endangered the safety of railway traffic, passengers or railway crew - The DTSB also investigates accidents that have occurred in aviation, maritime and road traffic - Also incidents are investigated - The purpose of investigation is only to improve safety - In major accidents they arrange public hearings, where witnesses are heard and the details are discussed in front of the public - Reports are public
Spain	Red Nacional de los Ferrocarriles Españoles (RENFE)	<ul style="list-style-type: none"> - The State railways investigates accidents by itself (Information about investigations is not available)

Russia	Ministry of Railways (MPS)	<ul style="list-style-type: none"> - Accidents are investigated by the inspectors/investigators of the Ministry of Railways - A separate investigation committee is set up for major accidents, but minor accidents are investigated by local organisations of the Ministry of Railways - Only a small number of copies of reports are printed and they are for internal use only. - The investigation is often carried out to find the guilty party of the accident - Investigation procedures have been the same for decades - The entire railway system is controlled by the Ministry of Railways
Estonia	Raudteeamet	<ul style="list-style-type: none"> - A Department of Railways was founded in August 1999. Its main function is to conduct inspections. - One task according to the law is accident investigation, but so far operators (Eesti Raudtee) conduct the investigations by themselves. - Because the department has recently been founded, procedures concerning accident investigations have not yet been settled - For investigation of serious accidents, the Ministry of Transport sets up an investigation commission - Reports are "in principle" public
Latvia	Latvian State Railways	<ul style="list-style-type: none"> - Within the national railways works there's an inspection unit which investigates accidents
USA	National Transportation Safety Board (NTSB)	<ul style="list-style-type: none"> - Founded as early as in 1967 - The NTSB is under the control of Congress - The NTSB investigates aviation, railway, road, pipeline and marine accidents - Also incidents are investigated - The purpose of the investigation is to improve safety and give information to survivors and families of victims - The NTSB is probably the most experienced accident investigation organisation in the world. Accordingly its investigators participate in investigations all over the world. - Reports are public and some of them are also published on the Internet
Canada	Transportation Safety Board of Canada (TSB)	<ul style="list-style-type: none"> - The TSB is independent from other state departments. - The TSB investigates rail, marine, pipeline and aviation accidents. - Also incidents are investigated - The purpose of investigations is to improve safety - Reports are public

Australia	Australian Transport Safety Bureau (ATSB)	<ul style="list-style-type: none"> - The ATSB was founded in July 1999 when the investigation organisations of aviation, maritime and road accidents were combined. At the same time a new unit for rail accident investigation was founded. - Located within the Ministry of Transport - Procedures concerning rail accidents are still not completely settled because the unit has recently been founded. - Also incidents are investigated - One task is to issue national safety strategy plans - The purpose of investigation is to improve safety - Reports are public
New Zealand	Transport Accident Investigation Commission (TAIC)	<ul style="list-style-type: none"> - Located within the Ministry of Transport - The purpose is to improve safety - It investigates aviation and maritime accidents as well. - Also incidents are investigated - Reports are public
Japan	Accident Investigation and Study Committee	<ul style="list-style-type: none"> - Founded in 1998 within the Ministry of Transport - Investigates only rail accidents - The organisation is weak because there is no law for accident investigation in Japan - The purpose is to improve safety - There have been discussions about establishing a stronger and more independent organisation - Minor accidents are investigated by the operator itself - The police has a notable role in investigations
India	Commission of Railway Safety	<ul style="list-style-type: none"> - There are traditions of railway safety from as early as the 19th century - Main tasks are inspections - Accidents are investigated if someone has been killed, badly injured or if a major property damage has occurred - A preliminary report is prepared within 60 days from the accident - Reports are not public

5 INTERNATIONAL CO-OPERATION

As mentioned earlier, the investigation of rail accidents in many countries is not arranged in the best possible way. It would therefore be desirable that as many countries as possible would establish an independent and credible investigation organisation. That would not only improve safety but also make citizens feel that someone cares about their safety. In this context it must be mentioned that, of course, an investigation unit within the railway administration can do good work, but in order to assure credibility there should not be any doubt about the investigators' independence.

Furthermore, the fact that an investigation organisation is separate from the railway authorities or operators offers other advantages, as well. The National Transport Safety Board of the United States has published a list of points on its Internet pages on how their role differs from that of the authorities. These points can be seen to apply in general to independent investigation organisations:

- The Board has no regulatory development or enforcement responsibilities to defend;
- The Board's staff is specifically trained to conduct accident investigations for the purpose of determining probable cause and recommending preventive measures;
- Investigations by other organizations are often much narrower in scope, such as fulfilling data collection requirements;
- The Board is the only organization with a formal safety recommendation process that is independent from the regulatory process;
- The Board always makes its findings public;
- The Board, unlike other organizations involved in accident investigations, has no liability interests at stake that may cloud objectivity; and finally
- Other organizations do not operate with the same level of independence as the Board.

Much remains to be done in developing rail accident investigation organisations in different countries. The best way to start could be international co-operation between rail accident investigators. In the meetings all good and bad experiences should be discussed so thoroughly that every country would be prepared to establish and develop a modern rail accident investigation organisation. Also information available from aviation and marine accident investigation experiences should be utilized.

Today there is one organisation that at least in some respects connects rail accident investigators in different countries. The name of this organisation is the International Transportation Safety Association (ITSA). Its member organisations are from Canada, The Netherlands, Sweden, the USA, Finland, India, New Zealand, the CIS and the UK. All organisations except the members from the CIS, India and the UK are so called multimodal organisations that investigate accidents in different transportation modes.

ITSA is an organisation for accident investigation in general and therefore it has not paid any special attention to rail accident investigation. There are possibilities to develop rail accident investigation within ITSA, but two aspects may be problematic. Owing to the small number of members, the ITSA cannot promote wider adoption of investigation procedures. Moreover, many of the member countries already have quite developed investigation organisations. Also the fact that the member countries are scattered all over the world may complicate co-operation since conditions, cultures, infrastructures and rolling stock differ a great deal from country to country.

A more effective way to promote the development of rail accident investigation at least in Europe would be the actions of the European Union. The EU should prepare a directive similar to existing directives concerning aviation accident investigation. The directive should determine what kind of organisation should carry out investigations of rail accidents. It should also determine what kind of accidents and incidents are investigated and what the public report should include. The purpose of investigations should be to improve safety and give public information.

It is unlikely that railway administrations or operators would suggest establishing independent accident investigation organisations because they tend to think that this will put them on the defensive. Railway organisations should consider that the proper investigation of accidents would help railways to find out all the facts about accidents and improve general quality management and safety. Indeed, if the relationship between railway organisations and investigation organisation is properly designed, mutual work for improving safety would be fruitful.

INTERNET ADDRESSES OF RAILWAY SAFETY RELATED SITES

Accident investigation Board Finland: www.onnettomuustutkinta.fi

Finnish rail administration: www.rhk.fi

International Transport Safety Association: www.itsasafety.org/itsa

Statens haverikommission (Sweden): www.havkom.se

Banverket (Sweden): www.banverket.se

Jernbanetilsynet (Denmark), www.jernbanetilsynet.dk

Health and Safety Inspectorate (UK): www.hse.gov.uk

National Transportation Safety Board (USA): www.ntsb.gov

Transportation Safety Board of Canada (Canada): www.tsb.gc.ca

Australian Transport Safety Bureau (Australia): www.atsb.gov.au

Transport Accident Investigation Commission (New Zealand): www.taic.org.nz

Commission of Railway Safety (India): ccrs.engineering.webjump.com

Union Internationale des Chemins de Fer (UIC): www.uic.asso.fr