Joint Accident Investigation Commissions – Experiences, Benefits and Dilemmas

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Abstract

Modern societies seem to be increasingly more vulnerable, especially where infrastructure, safety and natural disasters are concerned. Major disasters represent a different kind of loss, one that is not tolerated by the public, mass media, victims, or politicians. One way of trying to reduce risk and prevent accidents from reoccurring has been through the use of accident investigations in high-risk fields. Some countries have developed a more interdisciplinary approach and established multi-model commissions, primarily in the transportation sector.

This paper describes some of the experiences gained so far from Transport Safety Boards. The difference between the search for root causes and the apportioning of blame is underlined. The need for such investigation commissions to be independent bodies and to have highly competent staff is also stressed. A permanent commission works much better than one that is established on an ad hoc basis. Six benefits of having a joint accident investigation commission are described, ranging from the need to establish and maintain public confidence, via methodological and data arguments to the ability to reduce costs and meet future challenges. A number of dilemmas are highlighted. Although such dilemmas represent a challenge to company commissions, traditional investigation commissions and multi-modal commissions, the latter model will more easily provide stakeholders with acceptable answers.

In conclusion, the multi-modal commission model seems to be more capable of meeting future national needs as well as international challenges.

Introduction

Accidents, catastrophes, and disasters represent different kinds of loss – loss of life, human injury, material damage, environmental pollution, reduced production, *loss of*

goodwill etc. The losses are of different kinds and at different levels – ranging from loss of life and health, via environmental pollution to company losses; and from individual loss, via losses for the enterprise to societal losses. Some losses appear at once; others are only visible after a very long time. All parties involved should therefore have a profound interest in reducing the risk of accidents, and of minimising the effects of such losses.

Nevertheless, a systematic and organised approach to using experiences and lessons from past accidents and disasters for preventive purposes is still in its infancy. Although architects, engineers, and craftspeople have drawn on human experience for generations to improve their work, e.g. in drawing a house, a bridge or a road, in technical machinery, or in the different areas of handicraft work, a scientific attitude has been almost absent.

One of the earliest attempts to investigate accidents in a systematic way was the Accident Investigation Branch (AIB) of the Royal Flying Corps, established in the United Kingdom in 1915.[1] Another example was a Safety Board, set up in the USA in 1938, which was charged with the duty of investigating air accidents. The ICAO Convention (annex 13), adopted in 1951, specified that an in-depth investigation, as distinct from the investigation into the party or parties to blame, should identify and analyse the causes of an accident in civil air traffic. The European Union followed up this tradition in the aviation sector and issued a Directive in 1994 that established the fundamental principles governing the investigation of civil aviation accidents and incidents.[2] It was explicitly states that "the purpose of this Directive is to improve air safety by facilitating the expeditious holding of investigations, the sole objective of which is the prevention of future accidents and incidents."[3]

Today, all (or most) countries have a kind of public-sector air accident investigation institution, either as part of a larger accident investigation branch/board or as a separate commission. In addition, an internal accident investigation commission is usually established within each airline. This pattern, with professional investigation bodies both at the public authority level and at the company level, has been developed in other sectors, such as in rail and maritime traffic, in high-risk industrial sectors (the chemical sector, nuclear energy, production of explosives etc), and in the offshore and pipeline sector, for decades.

The relationship between the increased use of accident investigations and heightened awareness of safety in society seems to be strongly linked. In modern society, customers demand higher safety standards in public services; the mass media covers every large catastrophe or disaster in detail; workers are more opposed to and conscious of dangerous working conditions; many people are worried about the consequences of air pollution and climate gases; and politicians are in favour of strict regulation and control of **activities with dangerous societal consequences.**

However, the focus on accident or disaster investigations in post-industrial societies raises several critical questions concerning, among other things, their role, function, relationships, funding, number and competence of employees, different types of

[1] See Internet homepage for Air Accident Investigation Branch, UK. www.open.gov.uk/aaib/hist.htm
[2] Council Directive 94/56/EC of 21 November 1994, Doc. 394L0056.
[3] Ibid., p. 2

reports, consequences of recommendations etc. In addition, the very complex nature of some international disasters, such as the Estonia tragedy – 28 September 1994, 852 killed – also raises questions concerning the role of international ad hoc joint accident investigation commissions that are constituted by national representatives (in the case of the Estonia, this consisted of Estonia, Finland, Sweden).

Experiences

So far, apart from some unique examples of joint accident investigation commissions, mainly in the transportation sector (USA, Canada, Sweden, Finland, Australia, New Zealand, The Netherlands, Indonesia etc), the tradition of public sector approaches and/or internal company investigations is very strong. In most modern countries, the regulations require either permanent accident investigation bodies or the setting up of ad hoc investigations of serious accidents in certain sectors, primarily in transportation (air, maritime and rail traffic), working environment, perhaps in some high risk process industries, and defence. However, permanent, independent cross-modal approaches, though highly successful in some countries, are still rare.

Some of the experiences from the investigation field are:

Two separate kind of investigations: causes and blame

A common experience of those involved seems to be the profound need to separate the investigation of fundamental and underlying causes from the criminal law inquiry, which is restricted to discovering the direct cause of an accident. The aim of the latter type of inquiry, which is often followed up by legal procedures, is to find out who was to blame in the legal sense. On the other hand, the role of the in-depth investigation is to discover the root and underlying causes of the accident, and to propose recommendations to prevent similar accidents from happening in the future.

Power based on competence and independence

The National Transportation Safety Board (NTSB), established in 1967 in the USA, enjoys the reputation of being the most important independent safety investigative authority in the world.[4] The NTSB has served as a model for independent investigative authorities in many countries, and the calibre of its investigation has become the international standard.[5] The NTSB has no regulatory or enforcement power; its enormous influence is based on the persuasive power of its investigations and the immediacy of its recommendations.[6]

Both Pieter von Vollenhoven in the 3rd European Transport Safety Lecture[7] and the authors of the RAND report underlined the necessity of independence. Vollenhoven argues for the need for a completely different legal framework for the independent investigation: "To be successful, independent investigations need to be anchored in

[4] NTSB investigates accidents involving aviation, railroads, interstate buses/trucking/some other highway accidents, pipeline and hazardous materials, *and* maritime accidents.

[5] Report written by RAND Institute for Civil Justice "Safety in the Skies – Personnel and Parties in the NTSB Aviation Accident Investigations", December 9, 1999. Preface, page V. Among others, C. O. Miller has written a critical commentary discussing several aspects of the RAND Corporation study, 6 April 2000.

[6] Ibid., Summary, page xiii.

[7] Pieter van Vollenhoven, 3rd Lecture for the European Transport Safety Council. Independent Accident Investigation: Every Citizen's Right, Society's Duty. Brussels, January 23, 2001.

law, with regulations to govern the powers of the investigators. There need to be provisions giving the investigation board the power to decide which statements and which of the underlying reports can be made public. And the laws needs also to specify that the final report cannot be used as evidence in criminal or civil law proceedings."[8] The RAND report states that the "NTSB's unique role in transportation safety is contingent on the ability of the board members and the professional staff to conduct independent investigations of accidents and major incidents and, in so doing, to assure public confidence in the safety of our national transportation systems… The integrity of the NTSB's accident investigation process depends on the independence and skills of the agency's investigative staff, combined with the probity of the information provided by the organisations, corporations, and individuals designated to assist as "parties" in investigative proceedings."[9]

The combination of the two factors – independence based on the legal framework and integrity based on competence and skills – seem to be necessary requirements to obtain confidence from all parties involved.

Permanent, independent accident investigation commissions rather than ad hoc initiatives

As an immediate response in the wake of a major accident or disaster, politicians tend to propose the establishment of an investigative commission, perhaps as a symbolic gesture of decisiveness. Despite the best of intentions, an ad hoc commission also implies an ad hoc composition of the members of the commission – including the chairperson – and possibly an inconsistency in investigation methodology and in the writing and presentation of the report(s). Experience from the work of several ad hoc commissions indicates that such kinds of approach, at a public level as well as at a company level, have intrinsic weaknesses in terms of independence, integrity, organisation, competence, skills, forms of reporting, and procedures. On the other hand, a permanent and independent investigating body will develop aggregated knowledge and competence, recruit dedicated personnel, and emphasise teamwork, techniques and education, witnesses and reporting procedures with conclusions and recommendations. It is therefore a paradox that independent, multi-modal commissions are not more widely established and used.

Benefits

Independent, joint accident investigation commissions have several benefits compared to sector-based commissions either as part of a control authority or an integrated company commission. The scope of joint commissions can, for example, be determined by a functional sector, such as transportation, or societal needs, such as general accident commissions on a national basis. Some of the benefits of multi-modal commissions are:

Independence and integrity are more easily maintained

A broadly-based, joint and independent commission can more easily withstand attempts by other involved parties to influence and control the investigative process, conclusions and recommendations. Such a commission, with its own ethical standards and internal resources, is a large enough body to be able to fight such attempts. In

[8] van Vollenhoven, ibid, page 3.
[9] Rand report (1999), Chapter 1, pages 1-2.

addition, the role of the commission is often regulated by law. One disadvantage, however, is the financing of the commission.

Joint commissions can make use of a more scientific approach

Scientific developments in the investigation field may serve the practical investigation work with new methods, tools and theories.[10] Such theoretical and methodological progress can be more easily adopted by a broader number of professional staff, and it can further stimulate the internal working environment by promoting an innovative culture. A single investigation body will also make the contact work carried out by universities, research institutes and similar resource centres much easier. In a single investigation commission, all or most of the resources – which are often too limited - will be tied to the investigation of individual cases.

Joint commissions build up broader and aggregated competence and skills

The competence and skills of the professional staff are a crucial factor in the investigation process. The need for improved and greater competence, as the complexity of disasters and investigations is constantly on the increase, is easier to meet and develop further in a joint commission, which would represent several professions and employees with different occupational backgrounds and skills.

However, too few resources could undermine this advantage. In the RAND report, the third major finding was that "a lack of training, equipment, and facilities has placed the NTSB's ability to independently lead investigations of major commercial aviation accidents at risk…Little time for training and insufficient emphasis on professional development have combined to cause a general decline in professional skills. This is a significant threat to continued safety board independence."[11]

Root causes of accidents and preventive measures can be more easily identified and promoted by using knowledge and insight from earlier investigations in specific fields

Over time, joint accident commissions have the advantages of being able to collect, analyse and select information from several different accidents and serious incidents. With modern use of information and communication technology (ICT), the organisation may be 'a learning organisation'. The integration of data from past events with ongoing work can contribute to better information management. In combination with other tendencies concerning accident methodology, such data may also accelerate the shift to new paradigms. The tendency is clearly from normative, technical and legal concepts to scientific concepts, such as the concepts "hypotheses", "systems deficiency identification" and "accident scenarios", and from blame and accusation of individuals to system analysis. Dr. John Stoop argues that focussing on "systems deficiency identification" is an effort that requires "a structured search strategy from the investigator, management of his data and his hypotheses. It will require a multidisciplinary investigation team."[12]

The cost of administrative functions can be reduced

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[10] In a paper Accident Investigation: trends, paradoxes and opportunities (2001), Dr. John A. Stoop, Delft University of Technology, argues for a distinction between specific investigative skills and methodology and scientific approaches and procedures.

[11] Rand report (1999), Chapter 3, page 21.

[12] Dr. John Stoops paper (2001).

The financial and managerial costs connected to the scope and burden of administrative functions should be reduced with the establishment of joint commissions. More effective management procedures, and common systems for data processing and storing, communication and personnel management are only a few examples of functions that will give lower costs.

The ability to meet future challenges

Accident investigation will change, perhaps dramatically, in the near future. The public, the mass media, victims, and politicians alike will require professional and independent investigations of disasters outside the traditional transportation field (explosions, disco fires, fireworks, defence ("Kursk"), cruise ship fires, ski lifts, and natural disasters). Higher safety awareness in society will require permanent investigation bodies. New post-accident functions will challenge the traditional scope of the safety boards, as seen in the USA, where the Congress has adopted the "Aviation Disaster Family Assistance Act (1996). As a consequence, the NTSB has been granted new responsibilities in serving the victims of transportation accidents and their families. Obviously, the need for increased international co-operation – to match the ongoing process of internationalisation of goods and services - will lead to new ways of international investigation contact and organisation.

Dilemmas

Recommendations based on an unusual combination of circumstances

The main objective of independent investigations is to propose recommendations that, if implemented, will prevent similar accidents in the future. But, as Urban Kjellén points out, severe accidents are "usually the result of an unusual combination of circumstances, and it is unlikely that this particular combination will recur. A second and equally important task is therefore to make a systematic and independent examination of the organisational, technical and individual circumstances around the accident."[13] Kjellén argues that a commission that looks into the root causes and the SHE management system will, through its recommendations, neutralise interest groups within a company that would benefit from a limited investigation into situational factors. Moreover, the recommendations will not only reduce the probability of a recurrence of the particular event in question but will also improve the general safety level of the company.[14] Such an approach will cover both the management's commitments to SHE and the prevailing accident perceptions within the organisation.

The problem with a more system-oriented approach will be to define the right balance between the commission's in-depth investigations of more general root causes of a specific accident and the demands expressed by the media and victims to have concrete explanations of why the accident happened. The challenge for the commission will be to communicate the relationship between immediate and root causes convincingly, and to promote the preventive value of both specific and general actions.

The principle difference between independent and police investigation

The necessity of drawing a sharp borderline between an independent, in-depth investigation and a police investigation is clearly stated in several regulations, reports

[13] Urban Kjellén (2000), Prevention of Accidents Through Experience Feedback, p.173.
[14] Ibid., p. 173-174.

and textbooks. Urban Kjellén states that the main difference between an independent commission's approach to in-depth accident and near-accident investigations and a police investigation is that "the latter aim to discover which law or company procedures have been violated, who violated them and who is liable."[15] The difference has several consequences. One of them is the role and legal position of witnesses. Van Vollenhoven states that "statutory guarantees are needed to ensure that witnesses are free to tell the truth…the law needs also to specify that the final report cannot be used as evidence in criminal or civil law proceedings."[16]

Some dilemmas are most directly connected to company commissions:

When should an investigation by a special commission be conducted?

Most companies have an injury reporting system, partly for their own safety management use and partly as a consequence of mandatory regulations, e.g. from the transport inspectorate or labour inspection authorities[17]. The dilemma for the company is to decide upon the criteria which will trigger a special commission investigation and at which level the commission should be established: a corporate commission investigating every fatal injury, or a commission at a divisional level? What about a serious near miss, a major injury causing serious material losses or production losses? The same problem is faced by national inspection authorities, which often have an independent right and in some cases an obligation to conduct investigations. In some fields and in some countries the companies' duty to report is regulated by law. But such claims are often not harmonised across sectorial barriers.

Who should investigate a serious accident or near miss?

In the field of transport, the picture is quite mixed: from precise definitions, criteria, procedures and organisation set out in national or regional regulations to total dependency on the decisions taken in the single company. In Sweden, the Board of Accident Investigation is required by law to investigate specific types of accidents when one person (air) or several persons (other modes) have been fatally or seriously injured, when the accident has caused substantial (air) or extensive (other) damage or when some specific additional criteria are fulfilled[18]

What kind of competence is necessary in an AIC?

The competence required for participation in an internal AIC, set up by the company, may vary quite a lot from the formal requirements needed to work in permanent, public sector accident investigation commissions. One trend seems to be a shift from engineer qualifications to modern risk-assessment education. Requirements concerning competence in public investigation commissions seem also to differ. The Swedish Board of Accident Investigation regulations presuppose that the Director General and two of the other investigators be former judges. The kind of expertise needed for the other investigators is also specified.[19] It seems likely that background

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[15] Ibid., p. 174.
[16] Van Vollenhoven's Lecture (2001), page 3.
[17] In Norway, the Act of 4 February 1977 relating to worker protection and working environment, *imposes* a duty on the employer to report injuries and diseases (§21): "If, as the result of an occupational accident, an employee loses his life or is seriously injured, the employer shall immediately, and by the quickest possible means, notify the Labour Inspection and the nearest police authority. The employer shall confirm his notification in writing. The safety delegate shall receive a copy of the confirmation."
[18] SHK Homepage (www.havkom.se/english.htm)
[19] SHK Homepage.

experience, education and competence may colour the safety philosophy and models used in investigations.

What kinds of models are used to clarify causes, identify losses and promote preventive measures?

Traditionally, a single cause model seems to be the dominant explanation in many reports, identifying the cause as either violation of a safety rule (human factor) or a material cause (technical failure), especially in company reports. In modern safety management systems, more advanced models, such as the Loss Causation Model developed by Det Norske Veritas, are quite common.[20] An interesting question is to what degree cause models, loss identification and recommendations of preventive measures in a more advanced manner are reflected in different types of investigation reports.

What effects do proposals have in obtaining higher safety levels/better safety management?

Traditionally, if the cause is identified as a violation of rules, then the preventive measure tends to be in the same area. For example, the guilty person must learn and obey safety regulations the answer to a technical failure may be more technical inspections or testing. Modern investigations provide other answers. The National Transportation Safety Board (NTSB) in the USA has issued almost 10,000 recommendations in all transportation modes to more than 1,250 recipients. In their own words "more than 80 % of its recommendations have been adopted by those in a position to effect change."[21] On the other hand, an evaluation of the in-depth accident investigations of the Swedish National Road Administration concludes that none of the proposed 37 measures have initiated regulatory or any other kind of work at a central government level.[22]

What is interaction with safety culture like?

Are accident investigations in any way linked to the overall safety management system, or is this totally detached and independent? If related, what kinds of feedback processes are established? What is the time-span between the accident, the proposals in the report and the possible integration and functioning of a new measure as part of the safety culture? The challenge to a modern company that advocates the idea of a learning organisation will be to establish simple methods for leadership involvement and commitment, management mechanisms and communication systems that stimulate a rapid integration of new insights and knowledge from investigation reports into safety culture.

How are reports distributed and used outside the pertinent company or transport mode?

In some transport companies, the accident investigation report is a restricted document. In others, the full report is available on the Internet. In some transport sectors, a regional or international organisation has constructed databases based on information from such reports, and also in some cases gives full access to the whole

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[20] Larsen, Trygve Roed (1997) *Safety and Environmental Management in the Transportation Industry*, DNV Paper Series 97-P011. Oslo: Det Norske Veritas.

[21] NTSB Homepage (About the NTSB).

[22] Midtland, Kari, Muskaug, Richard; Sagberg, Fridulv; Jørgensen, N.O. (1995) *Evaluation of the In-depth accident Investigation of the Swedish National Road Administration*, page 39. TØI report 296/1995. Oslo: Institute of Transport Economics

report – as a commercial service. Other agencies offer the text of such reports as a public duty. A central question is to what degree there is a systematic distribution and use of the different kinds of investigation reports; in the company itself, among other transport companies of the same kind or within the transport sector, in international organisations, and by transport inspectorates and other public authorities.

What is the relationship between research analyses, innovation and results?

Some transport companies have a tradition of self-supporting functions, from leadership recruitment to training. This tradition is diminishing. Modern transport companies initiate and encourage research and are eager to make use of scientific findings. Additionally there may be a connection between company culture, its attitude to research and development, and the use of accident investigations in a process of continuous improvement.

What is the effect on public image?

The company's public image is of growing importance to top management. Public confidence in a company's safety management is often a necessary condition for survival in the market. The company's ability to handle major accidents and disasters, which are of great public interest and are closely covered by the mass media, and the way they follow up such crises, e.g. through investigations, is crucial. An open attitude, based on freedom of information, a customer-oriented approach and priority to public relations, increasingly characterises modern transport companies.

Conclusions

After having analysed the National Transport Safety Board as it functioned in 1999 in the USA, the RAND report[23] concluded with several recommendations aimed at accomplishing eight objectives. Some of the main recommendations are:

- Create a more expansive statement of causation
- Modernise investigative procedures
- Streamline training practices

Dr. John Stoop[24] concludes his paper by focusing on three areas of concern:

- low public confidence due to a change in disaster perception and suspicion of conspiracy
- a need for improved transparency and resource allocation due to increased size and complexity of accidents
- a need for improved skills and proficiency of investigators due to methodological issues

These examples of conclusions illustrate that the world's best investigation agency as well as the investigation bodies and the investigators themselves face immediate demands for improvement. Both the investigative process and the investigation bodies need to be changed. To my mind, these examples of present and future problems can be better dealt with through joint accident investigation commissions at both national and international levels as a point of departure. Since only about 7-8 countries have so far established such commissions, the challenge is enormous. But then, so are the benefits.

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[23] Rand report (1999), Chapter 4.

[24] Dr. John Stoops' paper (2001), Concluding remarks.

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