How Safe is Safe enough when it comes to safety crew onboard passenger trains? – A study of requirements and regulations in Norway, Sweden, Denmark and Germany

1. INTRUDUCTION AND OBJECTIVE

Scandpower has performed a study of the existing situation regarding requirements, rules and regulations concerning the crew onboard passenger trains in the chosen countries. The conditions in each country has been studied in order to compare the different concepts, and conclude if there are major differences in approach, requirements and methods. The study was focused on the application of the safety equipment of the trains, the tasks of the crew and evacuation requirements in case of an emergency situation. Information about internal regulations, restrictions, decisions, education and training regarding safety crew and their tasks in an emergency situation has been collected from train operators in Denmark, Sweden, Norway and Germany.

In addition to the mapping of the existing situation onboard trains in the selected countries, the purpose was also to find out national requirements and train operator internal requirements concering safety crew onboard passenger trains.

The purpose of the study is to evaluate the safety related importance of the manning of passenger trains with or without safety crew. Safety crew is here defined as personnel attending the passengers, who have special training in safety (i.e. avacuation, first aid, train operation, kommunication etc).

2. METHOD

The identification of the existing conditions and regulations was performed by interviews with selected train operators in each country. The personnel interviewed were in the position of "Safety Manager" or similar within the train operator company, having extensive knowledge of safety issues and manning of safety related positions.

The information collected at the interviews was based on a checklist produced by Scandpower for this special assignment. This checklist gives by no means a complete picture of the existing regulations and documentation at the participating train operating companies.

The information collected from the aviation and shipping industries is collected from international and national regulations, conventions and laws. The comparison with these transportation modes are limited to the set of rules given by the public authorities, i.e. not collected at the aviation/shipping operator level.

3. LIMITATIONS

The study does not cover other assignments for the onboard personnel, such as cases if illness, ticket handling or help/information in general to passengers.

4. REQUIREMENTS REGARDING DOCUMENTATION, OPERATION AND EQUIPMENT

4.1 Internal and External requirements

The internal (corporate) requirements regarding safety and manning is similar among the train operators who participated in the interviews. On a national level there are some minor differences, all operators are watching closely the further developments of new TSI´s by ERA, and implementing them as new or updated ones are being released.

4.2 Passenger train operation aspects an rolling stock requirements

Requirements regarding operational aspects, for example maximum number of passengers allowed, and restrictions regarding smoking onboard the trains, are very much alike among all interviews train operators.

The Danish requirements differ in line specific requirements in the sense that they are more specific. The authoritative requirements are specified for certain lines with long bridges and tunnels, for example regarding traction capacity before entering a tunnel.

The use of multiple means of communication onboard the trains are different among the interviewed operators. Some use mobile equipment together with fixed installations (phone fixed to the wall at a given place), and others do not have access to mobile phone. This gives the train crew limited access to communication with the train driver in case of emergency.

The possibility for internal evacuation within a train set (i.e. evacuation from one part to another, separated with fire walls) is different among the operators. This difference is mostly due to use of different kinds of rolling stock, where internal evacuation not always is possible. Although, there are also differences in weather the interviewed operators use this or not, or have routines for how and when this should be performed. Very few of the operators have training including this scenario.

Fire detection systems are somewhat similar, but the Danish operator has improved and complemented the detection systems on their stock due to ageing material and increased internal requirements.

Marking of emergency equipment, emergency exits etc are similar among all interviewed train operators.

The airport train operators both use checklists for overall emergency situations among their personnel. Other operators have specified checklists to be used in an evacuation situation.

5. CREW REQUIREMENTS

5.1 Positions and responsibilities

The following personnel "functions" are used among the interviewed operators. The naming of these functions is different depending on country, which is a bit confusing. The general responsibilities are described below. Each operator has their own responsibilities in addition to these.

Locomotive driver ("Lokomotivfører "(DK)/"lokförare" (SWE)/"Togfører" (NO)) – has different tasks and responsibilities depending on weather the train set has a train supervisor as of below or not. If there are no train supervisor the locomotive driver has responsibilities according to the *Train supervisor* below. When there is a Train supervisor present, the locomotive driver is responsible for communication with the Train supervisor and other personnel, and also for a correct departure procedure together with the Train supervisor and for communication with the train control centre.

Train supervisor ("Togfører" (DK)/"Ombordansvarig"(SWE)/"Ombordansvarlig" (NO)) – Is responsible for

- a correct departure procedure in cooperation with the locomotive driver
- information to the passengers via loudspeakers etc in case of emergency
- secure that trains passing into a tunnel fulfils the requirements before entering the tunnel (Denmark)

Other members of train crew – Can be responsible for certain safety related tasks according to routines and job descriptions, for example assisting in an emergency situation.

The overall conclusion is that the distribution of responsibilities is similar among the train operators. The responsibility for initiating of an evacuation effort lies on the locomotive driver until the local Rescue Service has arrived. The responsibility for actually carrying out the evacuation lies on the Train supervisor.

5.2 Specific requirements in each country

5.2.1 Denmark

The Danish train operator has an internal requirement regarding the crew onboard a train entering a tunnel. If the train set lack the possibility for a passenger to move from one end to the other during train operation, there has to be a train crew member present in each and every of the of the coupled train sets. When passing a tunnel there shall always be an additional crew member present in the train set besides the locomotive driver. In case of late change of train assembly, there is a checklist to use if the train has to pass tunnels along the line.

5.2.2 Norway

The Norwegian authorities have implemented an absolute requirement of at least one Train supervisor per passenger train.

The Norwegian operator has internal requirements including an inspection of the train set to reveal fires before entering a tunnel, and also during the entire tunnel passage. The Train supervisor must be present among the passengers during the tunnel passage.

The Norwegian airport train sets always consists of three cars. There shall, according to internal requirements, be one Train supervisor ("train host/hostess") present onboard each train set. If multiple sets are coupled, there shall be one Train supervisor on each set. The Train supervisor is responsible for an inspection of the train set to reveal fires before entering a tunnel and as well as during the entire tunnel passage. The Train supervisor is said to be the overall responsible for the passenger safety during the trip.

5.2.3 Sweden

Onboard rail-cars ("railbus") the driver is also the Train supervisor. Exceptions are the Öresund trains according to Danish regulations, where there has to be a separate rain supervisor present. Onboard train sets with locomotive and cars there is always a Train supervisor in addition to the locomotive driver. The Train supervisor shall perform so called emergency preparedness control of rail-cars (for example loudspeaker system, lightning system, fire extinguishers) before departure.

The airport train operator has flexible personnel categories, where it is possible to either work as a "train host/hostess" or platform personnel. The driver is also the Train supervisor and has the overall responsibility in an emergency situation.

5.2.4 Germany

In Germany, in addition to the locomotive driver, there shall always be one Train supervisor per additional car. The Train supervisor is the overall responsible for the passenger safety, as well as in an situation when evacuation is needed.

6. ANALYSIS OF THE IMPORTANCE OF SAFETY CREW

The study of requirements related to safety crew shows that the requirements are often similar but not alike. The most obvious difference is the national requirement in Norway regarding the minimum of one Train supervisor in addition to the locomotive driver. A far as the study has revealed, none of the other countries have the same requirement.

Technical solutions and requirements regarding operational tasks for the train crew are also somewhat different. Some of the train operators have preferred to choose technical solutions before organizational. The most effective method is probably a combination of several effective technical solutions in combination with adequate training and routines for the crew members.

The analysis of the importance of the safety crew in an evacuation situation, for example as a result of a fire in the train, shows that the presence of crew is of relatively little importance. Factors such as choice of materials, the overall design of the rolling stock, door opening functions and marking and design of emergency equipment has relatively seen much larger impact on the safety for the passengers. As a result of the potentially large number of passengers and the long train sets, there will always be a large number of passengers who have to save themselves in a fire emergency situation.

One conclusion is then that the crew onboard the passenger trains of today is not a dimensioning factor for the consequences of a passenger train fire, and there is practically no cost effective or practical way to enlarge the crew in order to eliminate the consequences.

Although, it has to be emphasized that the train crew has indeed important tasks in en evacuation situation, and that operation without personnel onboard is not recommended without proper safety actions taken to compensate those tasks.

Attentions should also be paid to the fact that onboard personnel, visible for the passengers, will have a preventive effect regarding arson, and the possibility to detect smoke before it develops to a large fire. This should be taken into consideration before any train operator removes the onboard personnel.

7. WHAT CAN WE LEARN FROM OTHER TRANSPORTATION MODES?

Other transportation modes (airplane and ship) may have different procedures and regulations. In order to find out if the train operators can learn a few things from the air and ship industry, a brief comparison with these modes were performed.

The comparison betrween train operation and aviation/shipping has revealed some major differences:

- The aviation and shipping actors make much more specific and strict demands regarding requirements for training and education of the crew. There are also a documentation requirement for each and every crew member, showing relevant courses taken and futher training taken to maintain the level of knowledge.
- The practical training in evacuation is extensive, and the need for new courses or repetitive training is depending on how many members of the crew are "new on the job" since last departure.
- The cabin crew (aviation) shall have education in how to treat "difficult" passengers and large number of people
- The use of checklists for emergency situations are extensive, and is weel trained.

There are absolute requirements regarding minimum number of safety crew. The following is an example collected from the aviation industry:

Table 7.1: Minimum number of crew related to number of passengers

No of seats	No of cabin crew
1 - 50	At least 1
51 - 100	At least 2
101 +	Additional 1 per each 50. passengers