

Comparative Study on Railway Training Provision in Europe

UIC European Network of
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EXECUTIVE SUMMARY

Background and objectives

This benchmarking report summarises the results of a pan-European enquiry that is based on face-to-face interviews conducted with the representatives of 18 different railway training providers in eleven countries. The study looks at how these providers deliver training to the European market and gives an overview of different aspects of training provision. Besides some more general topics (e.g. national training market, organisation of training provider, trainer staff), the conducted interviews deal with the training of the following three safety-critical job positions:

- **Train driver:** person who operates a locomotive or train.
- **Signaller / traffic controller:** person who operates the points and signals from a signal box or control centre in order to control the movement of trains.
- **Signal and interlocking technician:** person who carries out preventive and corrective maintenance work for signals and interlocking on or near the track.

For each of these three job position, the following training steps are analysed:

- **Initial training:** training in order to become a driver/signaller/technician (other term: basic training / education).
- **Developmental training:** training of new content areas (e.g. new engine type in the case of a train driver) (other term: enhanced training).
- **Recurrent training:** periodic training in order to guarantee a sufficient level of knowledge and skills – often including assessment or performance checks.

The following table shows how the eighteen training providers interviewed distribute among the different cells:

	Train drivers	Signallers / traffic controllers	Signal and interlocking technicians
Initial training / Basic training / Education	12	9	8
Developmental training / enhanced training	12	8	8
Recurrent training	12	4	5

Topics of the interview

In total, the following topics are in the focus of the face-to-face interviews:

- The first part of the interview deals with general aspects concerning the organisational structure of the training provider, the selection, training and certification of trainers, and the evaluation of training.

- In a second step, diverse aspects of recruitment, training approach, and training method are discussed for each of the three job positions.
- Thirdly, for each training stage in each job position, the settings and procedures of training are described in detail. In addition, the amount of delivered training in terms of participants and training hours is estimated.
- At the end, the training providers' expectations on future developments with regard to liberalisation, legislation, demography, and technical innovations are reported.

Results 1: Training providers' organisation and business model

The eleven different countries taking part in the study show quite diverse rail training markets, particularly in the field of train driver training. As an example:

In France, competition in rail training in the area of driver training is nearly zero as (a) the French railway market is still closed for foreign railway undertakings and (b) no foreign training provider is allowed to provide driver training to SNCF staff. Another situation can be found in Germany, where a very high number of train operating companies (TOCs) are operating on the network. There are also many training providers who actively offer training courses, especially to smaller TOCs with a limited training infrastructure (e.g. in terms of existing classrooms, simulators or real engines). However, a higher number of TOCs does not automatically result in higher competition in the field of train driver training. The railway market in, for instance, the United Kingdom has no substantial competition as driver training is always provided in house in order to ensure the quality and to mitigate risk.

In comparison to the driver training, signaller training is given by only one provider in each country. As far as training of signal and interlocking technicians is concerned, there are some countries with and others without competition.

Most training providers interviewed are specialised rail training providers. Others are part of a TOC or an infrastructure organisation. Many training providers were formed or re-formed in the beginning of the current century as a consequence of the restructuring and reorganisation in the railway market in the last few years.

One aspect becoming more and more important for railway training providers is the question of whether they should offer their services to staff from other countries and/or to staff in other countries. There is evidence that the internationalisation of the provision of railway training follows the internationalisation of railway operation. The main barriers for internationalisation are language as well as different national technical systems, rules, and regulations. Furthermore, the structure for business activities is often very different in foreign markets, which sometimes could make it difficult to step into. However, several training providers offer driver training to foreign train drivers who cross the borders and operate a train on the domestic infrastructure.

The quality of trainers and instructors responsible for training provision are of paramount importance for the success of a railway training provider. Therefore, the providers have to put much effort into recruitment, training, and certification of their staff. The recruitment situation of trainers is described by most training providers as problematic or very difficult. The main reasons for that are the relatively low

comparative salary, especially due to the loss of extra payments for shift work, a lack of quality of the applicants (pedagogical and didactical competence in addition to many years of experience and profound technical knowledge), and a lack of status of the position of a trainer in the railway industry.

Most trainers provide training for a specific job position, e.g. train driver training. Most of these trainers have been working for several years in this job position or still work on a part time basis. This procedure guarantees that the trainers have enough current knowledge and experience to be able to educate trainees in a given subject. Anyhow, the competence in pedagogy and didactics is something that also needs to be in place for a balanced job profile of a trainer. This balance is sometimes difficult to reach as many highly skilled rail employees are not used to teach and simply do not want to become a trainer. Normally, a new trainer is introduced into the job in a step-by-step manner by supervision of an experienced trainer. The situation regarding the certification of trainers differs very much between companies and countries. At some providers a certificate for trainers is not required at all, some providers hand out an internal certificate, and some mandate a third party for the certification, e.g. a neutral authority or service provider.

All training centres have implemented some kind of feedback system in order to analyse the trainees' acceptance of the given training (mostly done by means of a paper-pencil questionnaire). An empirical and scientifically valid study that systematically analyses transfer-of-training effects, the transfer to daily operation, and the contribution of different training methods on learning has not been conducted at any of the interviewed training centres. This could be the subject of some further research. Nevertheless, there are some indicators that could show that the training is successful and effective, e.g. the acceptance of the trainees or the feedback from the customers.

Results 2: Training for train drivers

Although the overall recruitment situation for train driver is not seen as difficult by the interviewed companies, some influencing factors may lead to problems, especially the quality of applicants in terms of education, attitude, and health status and the overall reputation of the job of a train driver that has decreased in recent years. In some countries, becoming a train driver is now less attractive because of a reduced salary and reduced task variety during daily working. There is already an ongoing discussion about whether it is really necessary to educate the trainee in topics/objectives that may not be relevant for the job, so there is the potential to shorten the basic training time and to add tailored parts relative to each operating environment.

The full range of training methods from classroom to controlled environment and e-learning up to simulation is used by most of the training centres for the education of train drivers. Simulator types range from software interfaces of the cab equipment up to full replica cabs with motion system. There has been a substantial investment in new training technologies and facilities over the last 10 years.

The number of training facilities used by a provider varies from only one centre to more than hundred facilities. This wide variation does not reflect the size of the country, but the decision whether to centralise training or not.

Innovative training approaches mentioned during the interviews are virtual classrooms, examinations in the driving simulator, linking the driving with the traffic control simulator for cooperative training of train drivers and signallers, advances in e-learning (so called 3D approach), and courses for green driving.

Initial training

As train driving is a safety-critical task, the education is highly regulated: All 13 interviewed training providers carry out fixed training regimes with specified numbers of theoretical and practical hours. These regimes also include a final examination after the education. The overall duration of initial training depends – besides some other factors - on the number of trained engine types, routes, and safety systems. There is some discussion as to whether it is really necessary to educate the trainee in topics that are not relevant for the later job, i.e. to shorten the basic training (and to have more developmental training afterwards).

The number of customers to whom initial training is delivered depends on several factors. One factor is the degree of liberalisation or competition in each country. Where high competition is in place, a higher number of train operating companies exist that do need new drivers. Another factor is the business approach of the training centre. There are very flexible companies, looking actively for new customers. Others do not have enough capacities for additional customers or are intentionally focused on only one big company.

Most training centres are also involved in the final examination. In order to guarantee an objective and fair examination, examiners and trainers are normally separate persons. This is also under discussion at the ERA. Another possibility is an examination board with different participants, e.g. a representative of the Rail Authority, a technical expert of the given TOC, an examiner of the training provider, and/or a representative of the Union. In some cases, the examination lies totally within the responsibility of the Rail Authority. Further means for achieving an objective examination are certified and well-educated trainers and a common pool of questions or (simulator) scenarios.

Recurrent training

Some kind of recurrent training is done in all interviewed countries, but not by all interviewed training providers. The training regime varies between every six months and every third year. The training content, as well as the training methods, differ between the training providers; several training centres make use of the simulator for recurrent training.

The completion requirements are not that regulated, especially compared to initial training. Furthermore, the purpose of recurrent training is seen in somewhat different ways in each training centre and/or TOC. Some providers understand the whole recurrent training as a regular assessment procedure, so checking the competence is the main purpose. Other providers use the training mainly to update the drivers in terms of new regulations or safety at work and competence assessment is the responsibility of the team manager.

Developmental training

The developmental training is the most heterogeneous type of training and covers a large variety of content, like training on new engine classes, new ATP systems, or for new routes/lines. The demand for this training depends on different factors, especially the scope of initial training where tailored initial training often results in much need for developmental training, the implementation of new technical systems (e.g. engines or ATP systems), and extent of job rotation.

For the purpose of this study, a developmental training course for an engine class was chosen, in order to enable a comparison between the different training providers.

Results 3: Training for signallers and traffic controllers

About half of the training providers reported some problems or even major difficulties regarding the recruitment of signallers and traffic controllers. As reasons for recruitment problems the providers mention the relatively low salary for signallers, unsociable working shifts, and problems with the occupational aptitude of the applicants.

For the education of signallers and traffic controllers, most of the training centres use the full range of training methods, including classroom training, practice in controlled environments (e.g. model railways, operational field), on-the-job training in the signal box/control centre, e-learning modules and simulators (replica of control panel, replica of electronic control centre). Furthermore, many training providers report plans for an increased usage in future. As reasons for the purchase of simulators the providers mentioned quality and efficiency of training (especially regarding incidences and difficult situations), possibility of competence assessment, and problems with the traditional training in the real setting (difficult to organize and expensive).

An international approach concerning signaller training is very limited because of different signalling systems. It is obvious that the signal boxes and control centres are static and the responsibility fully ends at the borders. The number of training facilities varies very much from training provider to training provider.

Innovative training approaches comprise e.g. the cooperative joint training of signallers together with train drivers, training simulators connected to a real operational control centre, and fully certified training material. These are to be encouraged.

Initial training

The initial training for signallers and traffic controllers is done cooperatively by the training centres and the infrastructure operators. Whereas the training centres mainly deliver theoretical aspects in the classroom and practical training using simulators and model railways, the infrastructure operator is normally responsible for the training on-the-job.

All training providers report that the amount of training in terms of practical and theoretical days of training is well defined. Furthermore, many of the training providers regularly check the learning gain of their trainees.

All but four training providers carry out the final examination. If the trainee fails, all but one of the training centres gives the opportunity to attempt a re-examination. Many providers apply specific conditions to their examination process, e.g. that trainees have to pass the written examination until they are able to participate at the oral examination. In order to guarantee an objective and fair examination, it is normally not permitted that the person that provided the training also carries out the examination. Furthermore, mostly examination boards consisting of different experts conduct the examination and/or define the questions.

There is no need to tailor the initial training for signallers and traffic controllers to different clients, because in most cases the training providers deliver training to only one customer, namely the national infrastructure manager. Nevertheless, there is some customisation in terms of pre-knowledge (e.g. initial training for trainees that are already pointsmen) and types of signal box.

Recurrent training

Not all training providers who are involved in initial training also give recurrent training for signallers and traffic controllers. Similar to initial training, the delivery of recurrent training is often split between the training provider and the infrastructure manager.

The assessment of competence and skills plays a different role in each company with some providers implementing assessment as one part of the recurrent training scheme besides traditional instructions in classroom and others assigning training courses depending on the individual assessment result.

The amount of obligatory recurrent training provided in the different countries lies between one and a half and three days per year. Just a minority of training providers reported that a fixed schedule for recurrent training exists.

Developmental training

The training providers offer several developmental training courses. The courses in the focus of the comparative study enable switchman or signallers working in small signal boxes to become a traffic controller responsible for controlling larger areas of railway operation and/or working with modern equipment. Nevertheless, the courses aim at different target groups and have somewhat different objectives.

Results 4: Training for signal and interlocking technicians

The term signal and interlocking technician is not used in a consistent and common way throughout Europe. Sometimes, it is in fact only one job position and thus the same training schedule covers the competences for both areas, signal and interlocking systems. Sometimes, it is seen as two different positions with two different training schemes, whereas being an interlocking technician could be the prerequisite for starting the training as signal technician.

Half of the questioned training providers reported some problems or even major difficulties in recruiting signal and interlocking technicians. Similar to the other two job positions (train driver, signaller), one main problem is not the amount of applicants, but the mismatch of applicant and job requirements. Another shortcoming of the job

position is the working time, i.e. irregular shifts, night shifts, and weekend shifts. In addition, the career perspectives are not attractive.

Classroom training is also common for the training of technicians, but more important for technicians is the practice in controlled environments at special workshops, depots or test fields. Training with replicas of specific systems, like exemplary points, switches or signal systems is not only important, but is also quite expensive due to the high number of different systems and due to the high costs of IT infrastructure required for installing the latest systems at the test fields. As a result, the training is often centralised to only a few training facilities. On-the-job training in the real setting is mostly done by the infrastructure companies and not at the training centres. The advantage for this specific job position is the fact that the work is done in working teams.

Reported innovative training approaches are using high-end multi-media material, a support hotline for trainees with specific questions or needs and a model railway connected with the interlocking hardware.

Initial training

As far as the high number of different system types is concerned, especially in the field of signal systems, a common initial training often does not exist. After the basics have been taught, most trainees get training on only a few specific systems tailored to their future workplace, resulting in the demand for developmental training being higher than in other job positions).

At all training centres, the initial training requires a specific number of theoretical and practical hours. Five of the interviewed companies provide 100 percent of the initial training in each country, i.e. there is no competitor at the moment.

Recurrent training

Signal and interlocking technician work in teams mostly headed by one employee. Therefore, supervision and competence checks take place every single working day. In some companies, the annual recurrent training is therefore less important compared to other job positions. Furthermore, most of the training is the responsibility of the team leaders and therefore not done at the training centres.

Developmental training

Developmental training for signal and interlocking technicians consists of training courses that deal with the knowledge and skills of new technical systems that were not covered by the initial training and/or never installed before on the infrastructure.

Discussion and recommendations

The interviews with 18 European railway training providers show that some phenomena and challenges in that area are common for mainly all providers. Nevertheless, the results also indicate that the training for railway staff in Europe is very heterogeneous and characterised by different speeds of liberalisation and business objectives.

As many training providers report problems in recruiting new trainers, the implications of this phenomenon on recognition, certification, and accreditation have to be considered; especially as these procedures are currently discussed by the European

Railway Agency. That implies, in particular, the **improvement of trainers' career perspective, reputation, and salary**; effective and high-quality training is the key requirement for safe and efficient railway operation.

Furthermore, **systematic and empirical studies on transfer-of-training effects have not been undertaken by the companies interviewed and are therefore completely missing**. This applies to all job positions, training stages, and training instruments used, but becomes particularly obvious when it comes to the **usage of modern and innovative simulator technology**. As far as this **challenge of training evaluation** is concerned, **the return on investment (ROI)** becomes a significantly critical question nowadays, as this approach deals with training as an investment and not as a cost factor. Therefore, the pay off of training is analysed by measuring tangible (e.g. productivity, error reduction) and intangible benefits (loyalty, team spirit) of training. As the measurement and calculation of the ROI is not an easy task, a joint research effort (e.g. on European level) is highly encouraged.

Although there are barriers for providing training on an international basis (e.g. like language problems, heterogeneous technical systems, rules, and regulations), there might be more **training providers** in the near future **who will seek for international business potentials** in the field of railway training to train drivers, signallers, or technicians **in foreign countries** that goes beyond consultancy and train-the-trainer approaches. Such providers will have to put their effort on a **transparent training approach based on an extensive training needs analysis and mobile and innovative training technologies (e.g. mobile driving simulators)**.

In the course of restructuring the former state railways, several TOCs have separated the freight train from the passenger train division. In several countries, the passenger division have also split up into high-speed operation on the one hand, and commuter/regional trains on the other. As a consequence, significant changes in job diversity took place that do not only lead to reduced task diversity, but also have implications for training regimes and salary. Training that is reduced to a minimum does not only results in less competent staff but also in reduced flexibility of the employer. Therefore, **training should be seen as an investment, not just as a cost factor**.