Framing risks in a safety-critical and hazardous work: the case of railway maintenance

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Abstract

The article analyses the social construction of occupational responsibility towards risks within railway maintenance. Railway technicians are charged with up keeping the railway infrastructure to support safe and timely transport. Simultaneously, this assignment necessarily exposes them to occupational hazards, placing them in a similar position to police officers, firefighters and paramedics. Technicians' claims an occupational responsibility towards transport risks, based upon two notions within occupational discourse. First, it is based upon the safety-critical nature of their tasks. Second, it is based upon the notion of service to the general public or the nation. The notion of occupational responsibility towards transport risks informs technicians practice and makes work meaningful. Dependence on each other for occupational safety requires a mutual responsibility for each other within the team. Both transport risks and occupational risks are framed as manageable due to technicians' competence, mutual trust and responsible practice. Occupational risk-taking is justified on the basis of the need to accomplish production goals given the resources and time at hand and the manageability of risks taken. Thus, through risk-taking, technicians compensate for inadequate corporate planning. Finally, I discuss the need for the corporation to take a larger responsibility to reduce the need for risk-taking.

Introduction

This article analyzes the social construction of responsibility in a safety critical and hazardous job, drawing on an extensive ethnography of railway infrastructure maintenance in contemporary Sweden[1]. Similarly to police officers, firefighters and paramedics, railway technicians' assignment to serve others safety through their work necessarily exposes them to occupational hazards. The simultaneous assignment for others safety and own hazard has profound implications for technicians' construction of risks, occupational identification and their practice.

I will analyze how both transport risks and occupational risks are framed as an occupational responsibility and what the consequences are for occupational health and safety among railway technicians. How is responsibility for addressing risks framed? What arguments are put forward to support claims for responsibility? How can risk-taking be responsible?

Risk and responsibility: safety-criticality, hazardousness and risk-taking

Railways are socio-technical systems, constituted of technology, actors and organizations inextricably interwoven in a 'seamless web' of interacting and mutually shaping components that also governs their everyday management (Hughes, 1986). Trains are run by train companies, the network is owned by the state and maintenance contracted to a state company and to private companies through public procurement. Trains are routed over the network by train dispatchers, who also coordinate train traffic and work on or near the tracks. Railway technicians are charged with up keeping the railway infrastructure to support safe and timely transport: inspecting, maintaining, repairing and constructing rails, embankment,

signals, telecom system and electric power supply. Simultaneously, this assignment necessarily exposes them to occupational hazards. Historically, fatalities among railway technicians have been high compared to other occupations. In a longer perspective figures have gone considerably down but fatalities still occur.

In the railway, like in many other safety-critical systems, hazards occur as an inevitable outcome of normal production (Perrow 1984/1999). Since hazards are continually produced, safety needs to be actively, purposively achieved in everyday practice, through successfully overcoming those hazards (Roberts, 1993; Sanne, 1999). To do their work on an everyday basis, railway technicians need to balance train safety against other ends such as timely trains, time limits, economic limits and their own safety. Balancing these demands in concrete situations require technicians to accommodate to situational circumstances such as task, place, track design, signals, weather etc. But what informs how they are addressed and balanced? Risks are identified, evaluated and addressed based upon their framing, argues Perry 6 (2005: 93):

> Frames organize experience; that is to say, they enable people to recognize what is going on, they provide boundaries, define what counts as an event or a feature; crucially, frames defines what counts as relevant for attention and assessment. Second, they bias for action; that is to say, they represent people's worlds in ways that already call for particular styles of decision or of behavioural response.

Experts, scientists, media but also corporations and occupational communities are powerful risk framers, not at least for safety-critical and hazardous jobs. Risks are framed through material and social relations at work and through occupational

discourse. An occupational community consists of: “[A] group of people who consider themselves to be engaged in the same sort of work; whose identity is drawn from the work; who share with one another a set of values, norms and perspectives that apply to but extend beyond work related matters“ (Van Maanen & Barley, 1984: 287). Occupational discourse extends beyond current situations and it is reproduced through storytelling, it is shown in an ethnography of US firefighters (Scott, 2005). Apart from being instructive in terms of addressing physical hazards, occupational discourse provides meaning to that addressing and serves to support processes of identification. To claim a responsibility for others’ safety promotes identification with and involvement in work, which has been observed among employees in safety-critical tasks such as train drivers, air traffic controllers, police officers etc. (e.g. Brown, 1995; Gamst, 1980). Many occupations develop a sense of internal commonality and uniqueness but especially those where the members are exposed to danger as part of their work and where they are dependent on each other for their own safety (e.g. Haas, 1977; Edelman, 1997). In these occupations, mutual responsibility towards each others safety is a prerequisite for proper belonging to the team.

In traditional team-based blue-collar jobs, occupational hazards are often constructed as manageable on a team basis and as a team responsibility. In a Canadian mine, most work used to be carried out in small locations, involving a few workers with a low degree of mechanized work, with no supervisors present (Hall, 1996: 98):

> [These miners] consistently described themselves as relatively autonomous workers who largely decided how to mine their own stopes or work areas and how to make their work areas safe. Many of the recognized risks were accepted as unavoidable features of

mining which they viewed as fair exchange for the high wages and bonuses which they earned and the relative autonomy they enjoyed in their work.

Miners regarded the risks they were exposed to as unavoidable but also known and manageable on a team basis, as an integrated part of their skill and identity as miners, as well as part of their team-based responsibility. The exchange of assumed responsibility for managing risks with material benefits can be regarded as an implicit contract with the employer.

In the railway, responsibility towards safety is constructed through both corporate and occupational discourse as “making it work” in the service of the nation. Occupational fatalities were very high relative to other occupations for many years. Historically, railway companies spelled out the employees’ unconditional personal responsibility to attend to both punctuality and train safety (Hasselberg, 2001). The occupational communities overtook most corporate values at an early stage and reproduced them through apprenticeship. Heroic images of railway employees working long hours or taking risks for the benefit of the travelling public expressed a notion of occupational responsibility towards the nation and the economy (Kjellvard, 1949: Gulowsen, 2005). Occupational pride was coupled to “make it work” under given circumstances, especially under conditions that threatened the railways functionality, sometimes justifying extreme occupational risk-taking (Cottrell, 1940). The responsibility to make trains run safe and efficient was not only a requirement; it was an appreciated, integrated part of the railway employees’ self-identification and practice. Indeed, long work hours and occupational risks were traded for permanent employment, occupational pride and social status in the service of the nation in a kind of implicit contract.

A salient part of this contract was occupational autonomy, often expressed as "freedom with responsibility". Even though safety regulations and other instructions spelled out the employees' work in considerable detail, most employees had to rely heavily on their own experience and judgment when it came to carrying out their work (Ryggvik, 2004). In most countries, until the mid 19th century, the most reliable track workers were assigned a *lengthman* (or platelayer) *post* with a corresponding cottage near the tracks, pertaining to a particular section of the *line* for which the lengthman was responsible (Lindmark, 1991). The lengthman maintained the line: clearing weeds, repairing minor faults, sometimes with the help of a number of track workers. The lengthman thus had varied tasks and freedom to plan his work according his own initiatives and plans, as long as he achieved what he was assigned.

The notions of occupational responsibility for transport safety will be used in this article as well as those of manageability, engagement and mutual responsibility within the team for each others safety. In the next section I will discuss the data collected and the methods used to collect and analyse it. The following section analyzes how transport risks are claimed to be an occupational responsibility based upon the safety-critical nature of technicians work. Next section, technicians' claims to occupational responsibility for occupational risks is justified on the basis of mutual interdependence for each others safety. Then I will discuss how occupational risk-taking can be justified, based on claims to manageability and the need to "make it work" under given circumstances. In the concluding section I will discuss the employer's responsibility for reducing occupational hazards.

Methods and data

The data that supports this paper was collected mostly in Midtown, in the years 2000-2004, totalling five months of fieldwork, followed by interviews and focus groups. I was assigned a safety certificate after having passed a two-week safety-training course, including risk assessment and the right to organize work. I studied three groups of railway technicians (tracks, signals and high-voltage) as well as train drivers and dispatchers. This was done in the same geographical area, as I wanted to study risk perception and how risks were addressed, from a system perspective, reflecting the interaction and coordination among various occupational groups and structured according to overall objectives and procedures. The technicians I followed and interviewed were all employed by stately owned Banverket Produktion, the major contractor. This corporation is the railway maintenance part of the old railway company.

I got access to the fieldwork through safety officers without problems. However, it took some time and considerable effort to achieve rapport and necessary trust between the informants and me. I came to an environment in which there was no previous experience of research and there was no relevant role for me to fit into. I was nicknamed, reflecting expectations of my role and what could be expected from me. I was put to test. Primarily though, I was treated as an apprentice: I was assigned simple work tasks and I was instructed how to behave responsibly in relation to railway risks.

I also organized focus groups with three to five participants from the same trade, since I assumed that the local teams had developed common norms for what risks

were seen as relevant, what risks you can take, what rules you can bend and when etc. Through the focus groups I hoped to be able to catch the group dynamics at work, such as sense making, knowledge transfer, social control etc., reflecting how occupational discourse frames experiences and biases action.

I typed the fieldwork notes, transcribed the interviews and the focus group recordings. The data was transferred to the QSR NUDIST™ program and coded. Coding reflected themes significant to the technicians such as “responsibility”, “competence” etc. as well as my emerging analysis, usually in terms of concepts without specific theoretical correspondence, such as “community”, “identity”, “accepted risk”, or it covered specific events or issues such as “derailment”, “incident reporting”, “safety rules”, etc. After coding, all data was retrieved thematically according to various codes and the codes were grouped. Then I wrote memos about the different groups in order to develop the analysis.

A safety-critical job – responsibility, manageability and engagement

Transport risks are framed as an occupational responsibility based upon technicians safety-critical tasks: their interventions produce the conditions for safe and timely traffic and they are framed as manageable due to technicians’ competence. I addition, this discourse also frames technicians experience in terms of engagement, that is, it creates engagement for others safety. First, the safety-critical nature of their tasks is the major reason for claims to occupational responsibility.

ETHNOGRAPHER: What is your responsibility [in terms of safety]?

SAMUEL: That the technology works of course… that is what we are employed for… it is quite a large responsibility… when you have taken things away… or repaired something or replaced something. (Signal technician, Interview, November 2000).

Transport risks define technicians assignment as it “is what [they] are employed for”. In addition, transport risks also forms part of an assumed occupational responsibility since technicians work makes a difference to other people. Technicians work with the infrastructure is not only needed to secure passenger safety. If they make errors, technicians might cause accidents. This is reflected in Samuel’s words when I asked him how a good signal technician should be: “Pretty careful. We have to be, you know, that’s the kind of stuff we are working with.” (Interview, November 2000). In 1987, two signal technicians at Lerum in Southern Sweden wrongly wired two threads from a switch. This was the triggering cause for a major head-on collision between two express trains, causing nine fatalities and 119 injured people. This accident is still talked about among the technicians as a reminder of the responsibility that follows with their assignment.

Second, through telling stories of incompetent outsiders such as “private entrepreneurs” and newcomers, technicians construct themselves as responsible, careful and competent to manage a complex safety-critical system (compare Duclos, 1987). As an example, a track technician reported that a contracting firm (‘outsiders’) had used uninsulated bolts to attach the rails to the sleepers. This might cause the bolts to conduct electricity unintentionally, causing ignorance on the part of the dispatcher about whether sections of track are occupied by trains or track work of if they aren’t. This is of course a major problem for the safe operation of trains. Without such global knowledge of the possible consequences of your work for other parts of

the system, you should not work on the railways, is the implicit argument. Since the railway system is tightly coupled and complexly interactive, intervention in one component often has critical consequences for other components and thus for the functionality of the whole system. Responsibility includes leaving the infrastructure in a safe mode, which necessitates knowing the consequences of your actions and checking its functionality before letting trains pass by.

Third, the notion of occupational responsibility towards a safety-critical task frames technicians' experience as it makes them engage in transport safety. A lot of the technicians work is boring: checking distances between tracks, checking resistance in electric circuits, changing broken bulbs etc. However, engagement arises from their contribution to achieving safety to others. Signal technicians Samuel and Sven and I clear weed growing between the tracks so that train drivers will be able to see signals and speed boards. Suddenly, Sven, around 25, sees a tall bush growing in between the main tracks on the line. Spontaneously he exclaimed: "What a mess! – you feel ashamed for the railway". (Field notes, May 2002). Sven's comment was not intended to support claims for responsibility: rather it reflects such a feeling.

Occupational hazards – unique, manageable risks and mutual responsibility

Occupational hazards set technicians apart from other jobs through their unique, fatal and definite character although technicians construct them as manageable through their competence and through mutual responsibility towards each others safety.

Close interdependence require mutual responsibility for each others safety in railway maintenance. The technicians protect themselves in two major ways. In "exclusive

track occupancy” or “green zone working” they accord with the dispatchers to close off a section of the tracks through setting signals around the section to danger. To ensure safety despite a potential mistake from the dispatcher, technicians should also short-cut the track circuit through a short circuit clip between the rails which sets signals are automatically set to stop aspect. Alternatively, technicians may assign one person from the team to lookout for the other(s). Both protection modes require that you can trust your colleagues to frame risks appropriately, that is, that they are able to recognize, make sense of and address risks appropriately, not at least when communicating with dispatchers.

First, occupational hazards set technicians apart from other jobs through their unique, fatal and definite character. Simultaneously, these hazards are constructed as manageable through rules of thumb.

High-voltage technicians Helge and Håkan are inspecting a control box for the local switch heating equipment. The box is located near the tracks with doors opening towards the forest surrounding the tracks. Standing behind the box effectively protects us from passing trains (maximum speed here 200 km/h). From safety training I remember that the safe distance to live tracks is 1.4 meters. I stop around 1.5 meters from the tracks, in front of the box, which Helge recognizes and tells me: “Hey there, come here – so that you don’t get dragged along [by the suction from the passing train]”. Shortly thereafter the express train passes us with high speed – Helge turns to me with a smile: “Mighty speed is it not?” (Field notes, October 2000).

The speed of the express trains running support the appropriateness of Helge´s suggestion that I should protect myself behind the box rather than through following safety regulations.

Second, occupational risks are also constructed as manageable through reference to technicians' competence and through mutual responsibility and trust within the team. As is the case of transport risks, this is most evidently displayed when competence or mutual responsibility breaks down: technicians talk about the uneasiness they feel when they have to bring school children with them out on the tracks for study visits or when they have to work with colleagues they don't trust because they have hearing deficiencies or have repeatedly shown careless attitudes, ignorance or insufficient attention. In the following event mutual responsibility broke down.

I follow Torbjörn and Torsten when inspecting a single-track line. Torbjörn asks the dispatcher to protect a number of track sections from approaching traffic but since we are about to walk a couple of kilometres we cannot use attach track circuit clips to achieve exclusive track occupancy: we would have to return to remove clips all the time. Instead, only the dispatcher set signals to stop. This means that we are left without protection against miscommunication with the dispatcher or against other errors that the dispatcher makes in regard to our protection. Torsten and I are walking a little bit behind Torbjörn, noting that the time for our protected work is running out and we are saying to each other: "Should not he call the dispatcher now?" After a while the dispatcher calls Torbjörn and asks him to return the section to his control.

Torbjörn recalled this event a couple of times when talking to other colleagues as an indication of irresponsible behavior: “What kind of men do I have?”. Even if Torbjörn had the official responsibility, Torsten and I should have reminded him when he failed to remember that the time for our track occupancy had run out. Mutual interdependence and fatal consequences imply that to be a responsible railway technician you have to be able to take care of yourself and also to ensure team safety, irrespective of formal roles and responsibilities.

“Making it work”: risk-taking as responsibility

In addition to the safety-critical character of their jobs, technicians’ notion of occupational responsibility is also framed through reference to their great undertaking in relation to passengers and the nation. The railway is constructed as a shared, public utility that the railway employees were trusted to take care of. This discourse is implicitly reproduced as part of technicians’ processes of self-identification: “This used to be our railway – we looked after it so that trains would arrive in time”, said Track technician Torgny (observation protocol, May 2000). Reference is sometimes made to the lengthmen who had great responsibilities but large discretion as to when and how to do their work.

This dimension of occupational responsibility is a residual of the heroic claims to “make it work” under any circumstances. Technicians claim they take responsibility for the railway, through doing what is needed, rather than what they are contracted for: “It is amazing how loyal people still are: you can call them in the middle of the night and almost everyone will be ready to start working, e.g. when there is a derailment”, said signal technician Samuel. This was confirmed by the network owner

(Interviews, November 2000). In addition, technicians claim that their contracts are always underspecified or incorrect in some salient detail: “products of the drawing board”. To correct these details and really “make it work” has always, in their own eyes, been their responsibility. “If we recognize a small error we take care of it… [even if it lies] beyond what is negotiated”, said high-voltage technician Harry (Interview, November 2000).

Railway technicians don’t express any individual heroic claims through risk-taking: “making it work” is a collective ambition that bias their actions to do what is needed under given circumstances, even if it requires certain rule-bending and risk-taking. This is part of their claim to “freedom with responsibility”: freedom to bend rules and takes risks and responsibility to do so when it is necessary. The following story describes a well elaborated corporate frame for identifying, evaluating and taking care of occupational risks in terms of risk analysis, safety rules, planning and overlapping safety barriers that ensure safety even in case of individual mistakes or technical errors. Thus, the frame constructs occupational risks as manageable. The technicians also follow these measures for the most part. However, to “make it work” in due time, a rule is broken and a risk is taken.

I follow Harry, Helge and Håkan on a night shift in August 2000 while they are rebuilding the overhead wires. We assemble at 9 PM in a rebuilt railcar which serves as their working platform. The railcar has a sky lift mounted on the roof. Working with overhead wires involves a risk for fatal electrocution (voltage measures 16,000 volts) so voltage has to be turned off on the section of the yard where they are working. But there is an additional risk too: if a train accidentally does not stop before it reaches

the boundaries of the section where voltage is shut off, the train's current collector might bring voltage into the area where work is performed, electrocuting technicians. Therefore the network owner has decided that while working on the overhead wires the dispatchers should also close off the sections surrounding the section to be worked on for approaching traffic.

Helge collects materials and prepare for tonight's work while Harry prepares his duties as electricity protection advisor: he has prepared for tonight's work through coordinating with both the dispatch services and with the permanent way management which sections of the tracks and of the electricity system that should be closed off in order to protect their work and also to allow for passing traffic. Harry goes through the planned work with me. He calls the dispatcher and asks for permission to move around the yard with the railcar that we are working from.

We start moving around the yard, applying different kinds of protection devices. Voltage should now have been turned off from the sections that Harry has agreed on with the permanent way management but as an additional protection we connect the overhead wires to underground wires, followed by measuring the voltage. The section that we are about to work on and the surrounding ones should also be protected from approaching traffic by the dispatcher through setting signals for entering the protected sections to stop, to achieve exclusive track occupancy for us. But in case the dispatcher make a mistake, we lock switches in a protective position, we set up obstruction boards and warning signs for approaching traffic and we apply short-circuit clips between the two rails, thus short-circuiting the tracks on the section

we will be working on. Short-circuiting the rails set signals at stop, and thus protects the technicians towards approaching traffic.

Helge drives the railcar into position under the overhead wires on the relevant section. Harry and Håkan enter the sky lift, manoeuvre it into position and start working. Tonight they are taking down boards indicating the identity of voltage sections (they are misleading), hanging from the gantries that also support the overhead wires on the yard. Suddenly Harry sees a board that is not assigned for tonight's work but he knows it should be taken down. The board is hanging from the same gantry that supports the boards that Helge and Harry is currently taking down, but it is hanging over other tracks, out of reach from the sky lift. Since the board was not planned to be taken down tonight, there is no time to move the railcar in position down under it. Harry mounts the gantry and climbs over to the board to remove it, breaking a safety rule. Later the same night, another board missing from the list is recognized and similarly handled by Helge. (Field notes, August 2000).

In an interview three months later Harry first ascribed safe practice to following rules and not committing errors. However, he admitted that the technicians sometimes break rules and take risks, such as in the case above. There is no real danger involved though: "You can break rules as long as you know what you are doing", Harry says, echoing many other technicians. The risk taken in the story, just like in other cases I have witnessed or heard of, is constructed as manageable and quite trivial with foreseeable, not too dramatic consequences. Because of margins, risk-taking is seldom punished through accidents. Technicians learn that certain risks are beneficial since they shorten production time and effort and require fewer personnel

or other resources. It should be noted that risk-taking is usually much less obvious and mundane than this case: it could be using a lookout man instead of exclusive track occupancy or using signal aspects as warnings instead of full visibility towards approaching trains.

Risk-taking becomes the combined expression of responsibility, skill and control: you have to take risks and you may do so, as long as you “know what you are up to”. Risk-taking is an everyday practice, without which production goals would not be met. Everyday time and manpower planning is dependent on it. Risk-taking and rule-bending is constructed as advantageous since it is manageable and since the consequences of not bending rules or taking risks in the specific circumstances would have been substantially worse in terms of production results. This means that technicians take occupational risks to compensate for inadequate planning, time constraints or poor resources. They take responsibility for doing what the corporation should have done.

Risk-taking certainly serves technicians’ sense of accomplishment and occupational pride, thus underpinning their identification as responsible. Twenty-five years ago, Swedish occupational physicians Peterson and Wingquist (1982) asked two groups of track technicians about why workmates break safety rules or take risks: the two most common answers were “it goes faster” and “the correct method is too strenuous” (ibid: 80-81, author’s translation). These findings should be understood in relation to their expressive attitude to their work, where train punctuality is sometimes worth taking a calculated risk, because of pride in the craft and loyalty to running trains. Peterson and Wingquist asked the track technicians’ foremen how they would

act if they realized that the agreed time of exclusive track occupancy was about to finish before the task was finished. The foremen answered that technicians almost always try to finish the work in some way before the next train arrives since they are unwilling to ask for extension of the time at disposal if this causes a train delay. There was a strong engagement to make trains run in time and personal safety is devalued.

Conclusions

Transport risks are framed as an occupational responsibility, informing technicians practice, based upon the safety-critical characteristics of their jobs and upon the notion of service to the general public or the nation. Occupational responsibility biases their actions too: it gives their work a socially significant meaning. Occupational responsibility engages them and makes them identify with their work. Occupational risks are also framed as an occupational responsibility due to the close interdependence on each other for their own safety. Simultaneously, technicians claim to take responsibility for transport risks is used to justify taking occupational risks to accomplish production with given resources and time limits.

The notion of a great undertaking where one takes risk on behalf of others is common among some occupational groups such as police officers, firefighters and search and rescue personnel (Scott, 2005). There is a significant difference though between the US firefighters described by Scott and contemporary Swedish railway maintenance technicians. The firefighters are individualistic and competitive. They voluntarily compete for opportunities to combat fire and sometimes stay longer in the fire rather than being exchanged with less fatigue colleagues, as a means to achieve thrill and to enact their preferred macho identity. Such practices are

counterproductive since they prolong the time needed for bringing a fire under control (ibid.). In contrast, railway maintenance technicians strive to “make it work” as a common achievement. They acknowledge certain risk-taking as justified since it is necessary to accomplish what is needed to be done in due time and with given resources and since it is manageable. Risks are taken but the notion of risk-taking is tabooed.

Risk-taking is often attributed to macho working cultures, not at least among safety officers and behavioral management programs but sometimes also among researchers (Iacuone, 2005). However, even if it is supported by such cultures, risk-taking should be seen as an implicit part of employment relations. In US construction work, risk-taking is an expected part of “actual operating procedures”, since workers who refuse to take risks also risks to be fired any day (Paap, 1999). Likewise, the responsibility shown by railway technicians through risk-taking to “make it work” should be related to the wider structural conditions that govern technicians’ work, which they have a little influence on. Railway technicians are in fact sacrificing their own health and safety while achieving safety for others.

The employer has a legal responsibility to conduct risk analyses and to reduce hazards through appropriate equipment, work organization, training and procedures. A salient part of this responsibility in railway maintenance is planning enough and appropriate time for work on the tracks. Peterson and Wingquist (1982) argued 25 years ago that the work organization, should be arranged so that it reduces the exposure to risks and the need to take risks. The employer should give higher priority for maintenance work. They also suggested that if work is carried out on one track on

a double-track section, speeds should be decreased for passing trains on the other track. Finally, they suggested that the time that tracks should be evacuated before trains arrived to a workplace protected by a lookout man should be extended from 10 to 20 seconds. Since then speeds have increased and night shifts, producing risks by themselves, have increased dramatically. For some major jobs, tracks are completely closed for traffic over a shorter period of time, during which a larger number of technicians work in shifts around the clock. Most of the jobs though, still take place in a hazardous environment full of running trains and live high-voltage equipment. In addition, there is much more traffic and trains run at much higher speeds than in 1982.

Thus, there has been and still is a tendency to take risks “to make it work” as a service to the travelling public, when the technicians compensate for inadequate resources on behalf of the company. Today, this pressure for risk-taking is complemented with contracts stipulating that railway maintenance companies have to pay a fine if they finish late.

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Footnote

[1] All geographical and personal names used here are pseudonyms, in order to protect the integrity and interests of the people who accepted to have me around or to be interviewed. Those who are cited have had the opportunity to check the accuracy of quotes, accounts and to withdraw from publication if they feel like it. I thank them all for giving me their time and attention.

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