

RAILWAY PERFORMANCE IN THE LIGHT OF INVESTMENT POLICY

What Indian Railways can learn from the Performance of European Railways

By Dr. F.A. Wingler, July 2018



Swiss Railways scoring in Europe with the highest Performance Index; Rätich Railway, Landwasser-Viaduct

PREFACE:

A **MODERN RAILWAY OF WORLD CLASS STANDARD** needs efficient **INFRASTRUCTURE** with a **HIGH CAPACITY RAIL NETWORK** allowing economical high Rail-Performance (high Route Capacity, short start-to-end Journey Time, high Punctuality and high Safety).

The whole Infrastructure should be owned and managed by one state owned **Infrastructure Management Company/Organisation/Undertaking**, which will be the only partner to deal with, concerning investment in maintenance of infrastructure. The **INFRASTRUCTURE** should be managed effectively and economically under one umbrella out of one hand. There must be a

governmental **INVESTMENT POLICY**, which guarantees a long-term financing agreement of long-term certainty.

Concerning **INFRASTRUCTURE MANAGEMENT** and **BEST PRACTISE IN TRACK MAINTENANCE**, as well **INVESTMENT POLICY**, India can learn and take lessons from high performing Central European Railways.

The Infrastructure Managers and Train Operation Companies from the Central European “**Alpine Railways**” (ÖBB, SBB-CFF, DB, RFI, SNCF, VTG, BLS, Shift2Rail and the European Investment Bank) are currently allocating record budgets for rail investment in the **DIGITAL REVOLUTION** with a Euro 205 Billion plan to revolutionise rail service. They will meet for a ground breaking event on 08th November 2018 at Vienna, Austria, for catalysing improvements of efficiency, reliability, customer experience and for helping to reduce costs.

It is the question if the Indian Government invests enough and will make the necessary structural, organisational and streamlining reforms/reshuffles in the Railway System to keep the current Performance Level or even to improve it under its **MISSION MODE PLAN** to become a Modern Railway?

Behind recent Indian Prime Minister N. Modi's rejection to install on the Indian network the automatic Train Protection System (ETCS Level 1 or Level 2), there is obviously the cognizance and insight that India's economy is not yet advanced enough to allow that more safety for the train passengers and for an increase of route capacity through shortening the headways can be made affordable by capital investment, latter needed for the implementation of a general **Automatic Train Protection System** (ATPS), something like ETCS Level 1 (limited protection) or Level 2.

Therefore, presently no investment priority is given in achieving more safety and higher route capacity by shortening the headways through general deploying of a modern Automatic Train Protection System on the whole network. The economic development of the country does obviously not produce enough revenue for the needed investment.

Unfortunately, the Indian Government under Prime Minister N. Modi has decided to give priority to the huge capital intensive scheme for a **Journey Time Cutting Project** for privileged train travelers on a stand-alone Standard-Gauge High-Speed Route between Mumbai and Ahmedabad. The common train-travelers in India will not benefit from this investment policy in terms of **Safety, Performance** and **shorter Start-to-End Journey Times**.

The common train-traveler, who cannot afford a higher ticket prize for a time-cutting service on the envisaged dedicated Standard-Gauge line,

will have to travel on the current slow Broad-Gauge Line under current safety conditions.

For a Railway, which suffers over a lengthy time under **poor Investment Policy** and **Underfunding**, it will take a longer time until the decline will be visible.

A Railway behaves like an **Elephant**. It can tolerate for a certain period negligence and ill-treatment until it reacts. But suddenly, like an Elephant, the track can take revenge for negligence and ill-treatment by running berserk. A neglected Railway will answer by nasty and unwanted **Train-Accidents** and a **Decline of Performance**.

In 2012, 2015 and 2017 the **Boston Consulting Group** carried out Europe-wide benchmark studies at a strategic level on the railway performances; see IRJ May 2018, p.6.

The 2017 study on the performance of European Railways suggest that states need to step-up investment in their rail networks, if they want to prevent a downward trend, or to sustain or to improve their performance level.

Europe's Railways continue to face the challenge of maintaining high performance in an area of austerity. Yet, despite budgetary constraints, several European countries have recently adopted ambitious investment plans to keep or improve the performance for their systems

➤ **The Boston Group revealed:**

The more a country increases railway investment, the greater will be the improvements in network performance. The value derived from public costs rises or falls along with the percentage of public subsidies allocated to infrastructure managing (best through a state owned **Infrastructure Management Company**, which manage the infrastructure under one umbrella; see F.A. Wingle: **LEARNING ABOUT INFRASTRUCTURE MANAGEMENT AND BEST PRACTISE IN TRACK MAINTENANCE FROM ADVANCED CENTRAL EUROPEAN RAILWAYS FOR INDIA'S JOURNEY TOWARDS FUTURE WITH THE MISSION MODE PLAN TO DEVELOP ITS RAILWAY ACCORDING WORLD CLASS STANDARDS**, posted May 2018 free for download on <http://www.drwingler.com> .

“Public Costs” are the sum of public subsidies and investment in the system. Public subsidies are recurring government contributions, that support passenger and freight operations and as well infrastructure. Public investments are government and company investments in infrastructure and construction projects.

The result of the 2017 studies reveals the following correlation strength over the time:

The more a country increases railway investment, the greater will be the improvements in network performance.

The three critical performance components of a Railway are **INTENSITY OF USE, QUALITY OF SERVICE** (encompassing punctuality, speed and affordability of fares) and **SAFETY**.

The key performance indicator is the **Railway Performance Index (RPI)**. This enables a clear comparison of the key performance, safety and quality indicators, taking into account economic aspects. In the long term this will make it possible to deduce overriding trends: [The Boston Consulting Group, ed., The 2015 European Railway Performance Index, https://www.bcgperspectives.com/content/articles/transportation_travel_tourism_public_sector_european_railway_performance_index/, accessed on 18.07.2016., International Railway Journal, June 2018, page 18-20].

➤ **Calculating the Railway Performance Index:**

The Railway Performance Index (RPI) is formed in equal parts from performance parameters, quality characteristics and safety parameters:

The **performance parameter “Intensity of Use”** is made up of the passenger and freight traffic load of a country in relation to its population.

The **quality feature “Quality of Service”** is made up of punctuality figures for regional and long-distance traffic as well as of the share of high-speed traffic and the average ticket price per passenger kilometer travelled.

The **“Safety Parameter”** considers the sum of accidents and fatalities per train kilometer; this is derived from the number of train kilometers multiplied by the distances covered; see **Fig. 1**:

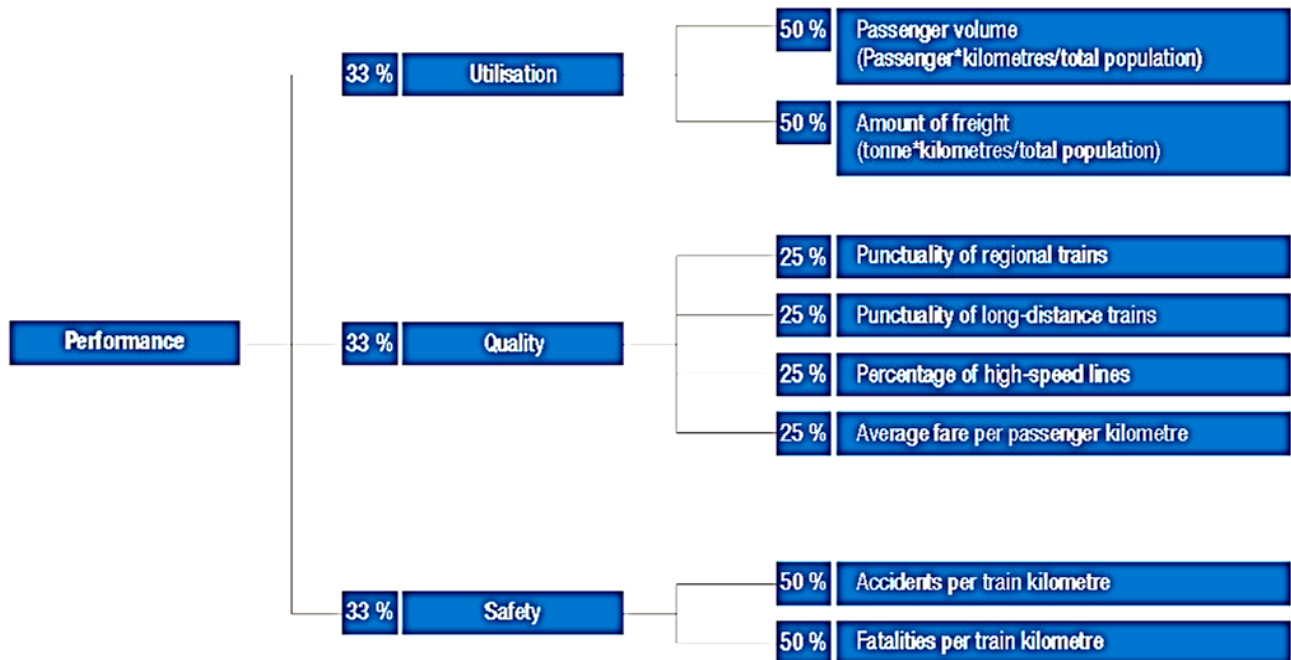


Fig. 1: Composition of the Parameters for the Railway Performance Index; from Florian Auer: *INFRASTRUCTURE MANAGEMENT*, 1. Edition; PMC Media House GmbH, Bingen, Germany, 2018; ISBN: 978-3-96245-155-4

In the analysis of the RPI two aspects need to be considered:

1. With the quality parameter passenger traffic is slightly less strongly weighted than freight traffic.
2. Countries covering larger areas have an advantage when determining the quality of service due to their likely higher share of high-speed lines.

➤ Results of the Boston Consulting Group Study:

A study concerning the Railway Performance Index was carried out in 2012 for the first time. In 2015 and 2017 the study on the European Railways was repeated. It shows the capabilities of the countries' rail traffic based on the Railway Performance Index. Switzerland, Finland, Germany, Austria, Sweden and France are ranking highest in the 2017 chart (Tier 1). In 2017 Austria graduated to Tier 1; compare **Fig. 2 and 3**:

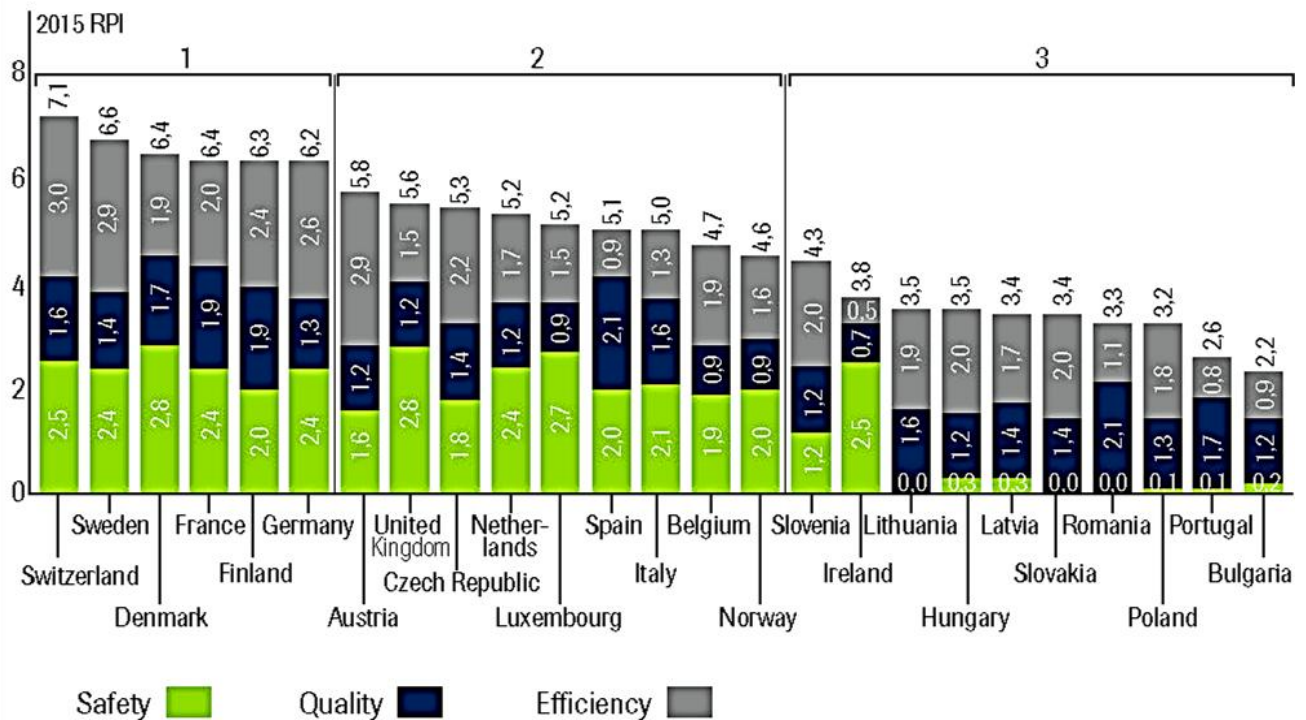


Fig. 2: Country Comparison as per Railway Performance Index 2015; see Florian Auer: *INFRASTRUCTURE MANAGEMENT*, 1. Edition; PMC Media House GmbH, Bingen, Germany, 2018; ISBN: 978-3-96245-155-4

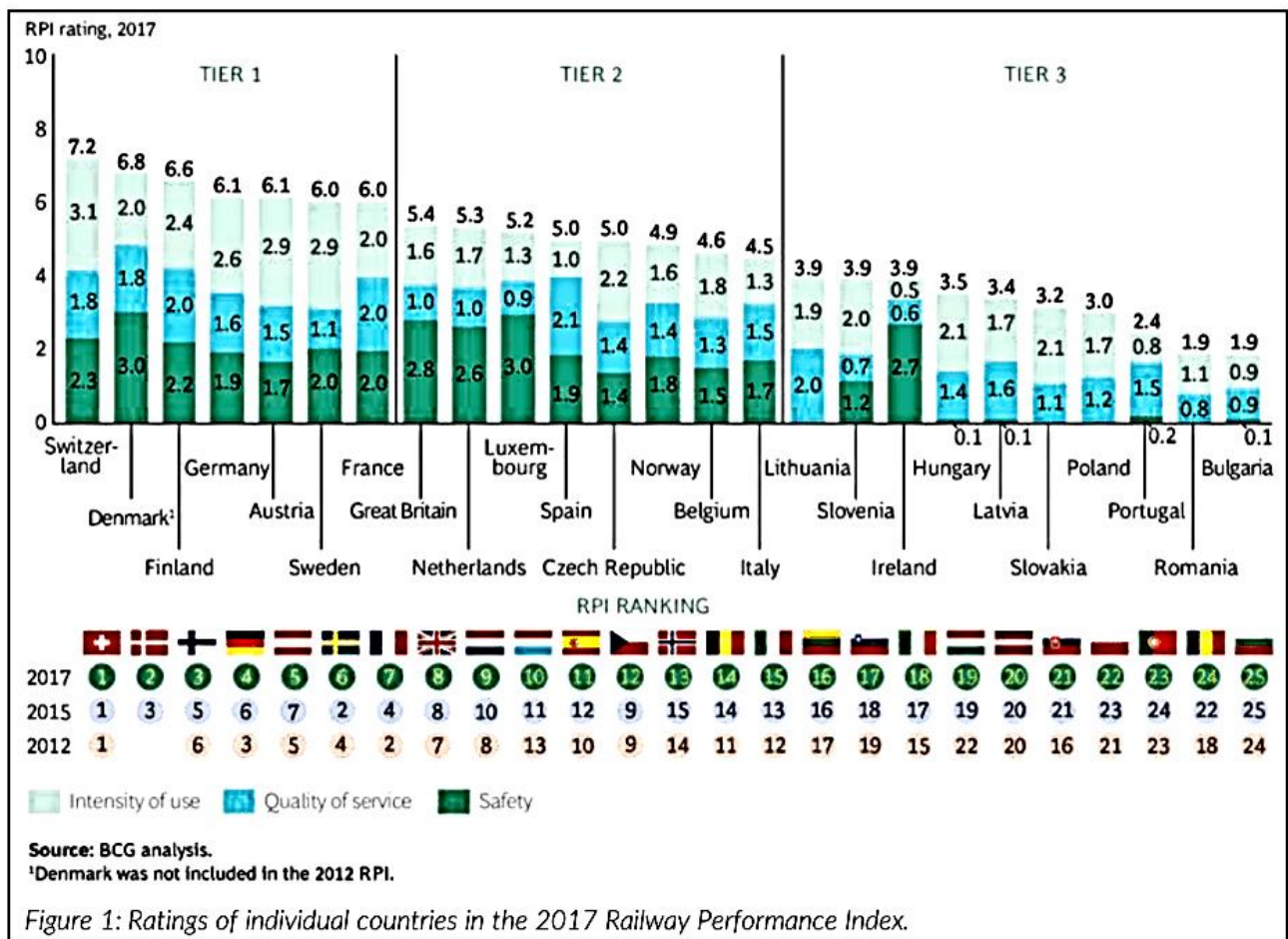


Figure 1: Ratings of individual countries in the 2017 Railway Performance Index.

Fig. 3: Country Comparison as per Railway Performance Index 2017; see: IRJ, June 2018

The results from 2015 were also compared to those of 2012. Only minor changes could be determined. **Once again: In order to achieve sustainable changes in railways, it is necessary to have medium- and long-term periods of planning and measures.** The outcome, that a bigger available budget (public costs) increases the railways' performance, is not surprising. The studies reveal differences in the value, which countries return for their public costs. Denmark, Finland, France, Germany, Netherlands, Sweden and Switzerland capture relatively high value-for-money, because they have efficient working **Infrastructure Management Systems**; see Fig. 4.

An efficient working infrastructure management system/company/undertaking, which owns and manages the whole infrastructure under one umbrella, is a prerequisite for capturing high-value-for-money. In this respect India lags far behind European Railways.

In those high ranking countries (Tier 1 and 2) the subsidies are provided directly to the effective working Infrastructure Managing Undertakings rather than spread to different organization (as in India).

To reverse a **downward Performance Trend** one needs to overinvest in the system for a longer period to begin the long process of reversing the downward performance trend. Countries, which experience the beginnings of a downward trend (for example a downward trend in Track Quality as in India) and hold the public costs at current level, they will be not able to maintain their current performance level. This means, railways, which are on a downward performance level, will have to overinvest for a longer time in order to hold up or to reverse the development.

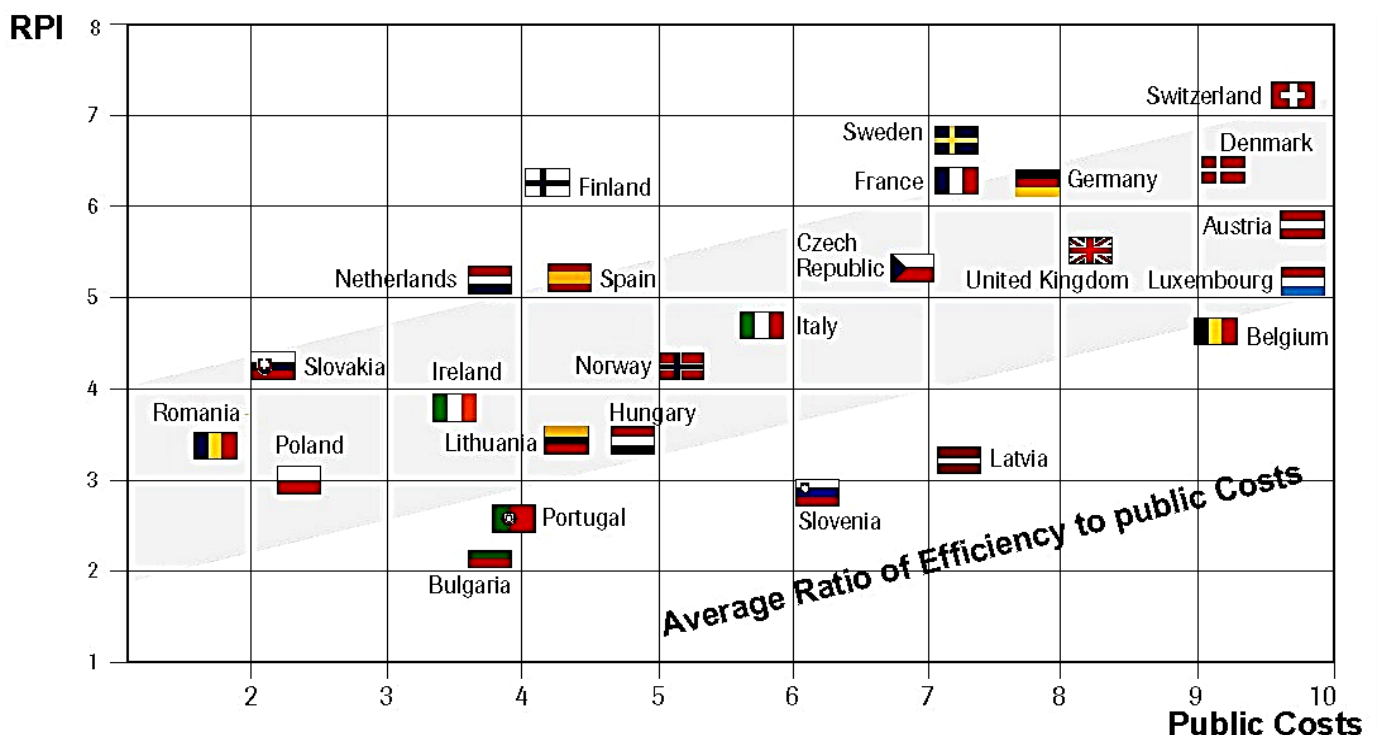


Fig. 4: Relationship between Railway Performance Index and public Cost of Infrastructure, 2015; see Florian Auer: *INFRASTRUCTURE MANAGEMENT*, 1. Edition; PMC Media House GmbH, Bingen, Germany, 2018; ISBN: 978-3-96245-155-4

A higher degree of privatization does not automatically allow conclusions about the performance of the railway.

The report from 2012 looked at the relationship between the Railway Performance Index (RPI) and the degree of privatization, and it did not find any direct correlation. The criticism voiced in the 2001 EU White Paper, which states that the performance of the European railways could be improved through a higher degree of privatization, could not be proved.

The 2015 study determined for the first time the relationship between the manner in which public funds are used and the resulting value for money for the public. The results are clearly more positive for countries, which attach greater importance to investment in infrastructure than investment in railway undertakings.

The studies over the span from 2012 to 2017 show also that railways with a decline in performance experience an increase in the number of train-accidents!



Swiss Federal Railways, SBB-CFF-SFF, score in Europe highest in Terms of Intensity of Use and overall Performance



State owned Danish Railway scores in Europe presently (2017) highest in Terms of Safety



Spanish RENFE scores in Europe presently (2017) highest in Terms of Service Quality; TALGO High-Speed Train

➤ **Prerequisite for an efficient working modern *WORLD CLASS STANDARD RAILWAY***

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- **India`s Prime Minister N. Modi rejects Indian Railways ETCS Plans; see IRJ, May 2018, page 6; No Investment Policy in India to increase Safety for Passengers and Route Capacity by shortening the headways through the general Deployment on its Network of an automatic Train Protection System on Basic of something like ETCS Level 1 or Level 2.**

Modi rejects Indian Railways ETCS plan

INDIAN Railways' (IR) Rs 780bn (\$US 12bn) plan to install ETCS Level 2 across its entire 67,368km network has run into a hurdle after India's prime minister, Mr Narendra Modi, rejected the proposals on cost grounds.

At a meeting with Railway Board officials on March 26, Modi is understood to have argued that the mass rollout of ETCS on the Indian rail network is not currently feasible, considering that the technology had not proven its suitability for use in Indian conditions. "His view was that ETCS should first pass performance tests in heavy traffic density sections," sources said.

IR's own finance department has also raised concerns over the projected costs of the rollout programme in an internal memo.

International suppliers including Ansaldo STS, Alstom, Bombardier, CAF, Siemens and Thales have expressed an interest in participating in the programme since it was announced by railways minister, Mr Piyush Goyal, earlier this year. Goyal has suggested that the work could be awarded to a single supplier to enable IR to capitalise on economies of scale.

In recent years IR has experimented with various technologies, including the domestically-developed Anti Collision Device (ACD) and the Train Collision Avoidance System (T-CAS), in a bid to improve safety on the network.

System (T-CAS), in a bid to improve safety on the network.

ACDs are in operation on some sections of the Northeast Frontier Railways network, but the Railway Board is unwilling to extend use of the technology to other parts of the IR system.

Field trials with T-CAS are currently being carried out on South Central Railway's 250km Lingampalli - Vikarabad - Wadi - Bidar line.

ETCS Level 1 is also in operation on the Delhi - Agra

IRJ May 2018

In India the Route Capacity is poor, and the average start-to-end speed in the range of 40 to 60 kmph of long-distance express-trains is remarkable low. One underlying factor is the long headway, which the present signalling system sans an automatic train protection device produces. Short headways of advanced railways with up to 3 minutes cannot be reached.

Behind recent Indian Prime Minister N. Modi's rejection, there is obviously the cognizance and insight that India's economy is not yet advanced enough to allow to implement more safety for the train passengers and an increase of route capacity through shortening the headways, that could be made affordable by capital investment, latter needed for the deployment of a general Automatic Train Protection System, something like ETCS Level 1 (limited protection) or Level 2; see F. Wingler: *EUROPEAN TRAIN CONTROL SYSTEM, ETCS: What ETCS is and how does it actually function*, posted on August 14 on <http://www.drwingler.com>.



Conventional Colour Light Signalling in India allowing only long Headways; at Hospet

Therefore, presently no investment priority is given in achieving more safety and higher route capacity by shortening the headways through general deployment of an **Automatic Train Protection System (ATPS)** on the whole network. The economic development of the country does not produce enough revenue for such a high investment.

Unfortunately the Indian Government under Prime Minister N. Modi has decided to give priority to the intensive capital investment scheme for a **Journey Time Cutting Project** for privileged train travelers on a stand-alone Standard-Gauge High-Speed Route between Mumbai and Ahmedabad. The common train-travelers in India will not benefit from this investment policy in terms of **Safety, Performance** and **shorter Start-to-End Journey Times**.

The common train-traveler, who cannot afford a higher ticket prize for a time-cutting service on the envisaged stand-alone

Standard-Gauge line (- which cannot be integrated in the current rail-network because of different gauge -), will have to travel on the current slow Broad-Gauge Line under current safety conditions.



Is the Indian Economy strong enough to afford a huge Capital Investment Scheme in a Journey Time Cutting Project through a dedicated Standard-Gauge High-Speed Service between Mumbai and Ahmedabad?