Chapter 8

Conclusions & Recommendations

In previous chapters we have seen that growth in the primary demand and overall industrial growth in India has posed a significant challenge to Indian Railway, to sustain the growth in years to come. IR has recently projected high growth for the railways and has set steep freight targets for the 11^{th} five year plan & for year 2020 in their Vision 2020 plan. The target is to double the operations by that time (1850 mill MT). This is coming in the time when Railway is facing saturation in terms of the asset utilization and the ambitious plan of the railway may run into resource crunch unless IR improves its operational efficiency and use its resources optimally.

IR in the wake of this challenge is exploring all means to increase its efficiency while it also faces the challenge of reliability, safety & aging infrastructure. Indian Railways fall much behind other Asian countries in terms of & speeds and line capacity. The average speeds of freight trains are only 25 KMPH in India and line capacity which is defined as numbers of trains run between a block section in a given time, is of the order of 50 to 60 trains per day. The reasons of poor performance of freight movement in India were examined in details and it was found that large bottlenecks are affecting freight movements, which can be classified in four categories: demographic, infrastructural, operational & speed related.

It was observed, how line capacity in IR is saturating on account of various factors like high speed differentials, laggard freight trains in terms of low speed, poor HP/TL ratios & various infrastructural bottlenecks. Wide variety of train mix is leading to high heterogeneity & passenger centered operational approach is contributing to sub optimal performance of freight operations. It was also argued that mere infrastructural augmentation for instance in signaling alone will not yield desired result unless speeds of the freight trains are increased and speed variance is minimized.

The basic reasons for low speed & speed differentials was examined & low Horsepower to trailing load (HP/TL) ratio came out as one of the most important factors affecting the speeds of freight trains with wide scope of further improvement. This means that IR is not deploying adequate powered locomotive to pull the freight trains, whereas for passenger trains HP/TL ratio was found to be adequate.

In Chapter 4 the role of HP/TL ratio was analyzed in detail on parameters like speed, distance to achieve speeds and acceleration of the goods trains and it was observed that low HP/TL ratio of around 0.8-1 prevalent over IR cannot provide desired acceleration and run trains at sectional speeds of 75 KMPH or more on all terrain of IR. Improving HP/TL ratio to 1.5 and beyond was found to improve freight train running parameters to a great extent and reduce the running time in the section. This aspect was also corroborated by the simulation results of study conducted by LRDSS team, discussed in chapter 5. The study indicated that line capacity enhancement upto 30% was achievable using this strategy. Thus it was established that deployment of adequate horse power of locomotive/locomotives bank to train load (HP/TL ratio), can achieve the desired speed & result in increased line capacity/throughput.

In subsequent chapter the impact of providing higher powered locomotive on the other parameters like wagon turn-around, rolling stock reliability etc was analyzed and it was found that it will improve wagon turn-around time by 20% or more and will also provide host of other benefits like reduced requirement of Crew, reliability improvement and finally provide synergies of train operation due to reduced speed differentials & heterogeneity. Owing to all these benefits it was suggested that IR should adopt the strategy of running freight trains with adequate HP/TL ratio of 1.5 or batter so that they can obtain average speed closer or better than the commercial speeds of the passenger train & that they can be run ahead of the passenger trains.

The gain from adopting this strategy will be in the form of faster turnaround releasing upto 30% excess loading capacity with the railways which can provide scope for much desired future growth. The effect of this strategy was also examined on the LHC & running cost and was found to be minimal.

To increase the HP/TL ratio to 1.5 in short term & to 2 in the long term, higher HP locomotives or multiple formation have to be implemented by IR. Requirement of additional locomotives required for this strategy was calculated developing different scenarios. The requirement of locomotives came out to be 685 in the worst scenario and lesser if we take higher savings on account of better speeds. It was assumed that 30% savings on account of the faster trains is reasonable & was adapted for further analysis. Based on this, an implementation strategy was formulated & requirement of locomotives was projected for next three years. IR will require about 300 additional Electric and Diesel Locomotive to implement this strategy.

It came as conclusion that with the present resources in terms of locomotive rolling stock available with IR the high HP/TL ratio can be implemented for heavier BOXN/ BOX rakes which account for 60% of the total freight loadings. The lighter BCN rakes for time being can be run with single locomotive of 6000 HP which are capable of providing a HP/TL ratio of 1.5. However in the next step to improve the ratio further to 2 all driving units will have to be converted to multi. This can be implemented as and when Railways are able to induct enough locomotives.

Financial implication and the capital investment required for it, in the form of the locomotive cost was seen to be in the order of 5000 Cr. which is a fraction of the annual plan outlay of IR & with the kind of savings involved it appears to be highly viable proposition.

Lastly it was observed that there is a need to increase the production capacity of locomotives if this strategy is to be implemented. PSUs & private companies can also play a vital role in bridging the gap in the supply of the locomotives and Railways has to start planning for the same without losing time.

Recommended Action Plan

Based on the above findings a consolidated action plan is recommended:

A. Short Term (2-3 Years)

1. Strictly implement the freight speeds of 75 KMPH and plan to upgrade the same to 100KMPH in about 3 years time.
2. Make it mandatory to run all freight trains by HP/TL ratio of 1.5 or better. This will require running all BOXN/BOBRN/BOY rakes with multi DUs while single WAG5/WAG7 can be utilized for BCN rakes. All freight trains in the section should be run with right power to take advantage of higher sectional speeds. In due course as locos are made available all trains should be run on multi.
3. Production capacity of EMU/MEMU at ICF/RCF to be enhanced as an urgent measure to enable replacing all slow moving loco hauled passenger trains with EMU/MEMU, to bring down the speed differentials.

4. Additional 250 Electric & 175 Diesel locomotives per tear should be planned to be made available so that full multiple operation can be implemented after 3 years time. For this production capacity of locomotives at CLW and DLW should be augmented to make available the additional locomotives & private or PSU should be encouraged to fill in the gap.

5. CLW and DLW should plant to produce high HP locomotives (6000 HP and more) all lower Hp locomotives should be phased out. Development of higher power locomotives (9000 HP for electric & 6000HP for Diesel) should be taken on priority basis.

6. Equipment reliability improvement for the rolling stock: wagons & locomotives to bring down failures and maintenance requirement.

7. Identify the sections with lowest line capacity in a route, which reduces the overall line capacity and concentrate to improve the same.

B. Long term Measures:

1. Upgrade freight speeds to 100 KMPH.

2. Plan to enhance loco production capacity to bridge the demand supply gap. Total annual requirement of freight locomotive will be about 600 in the long term.

3. Replacing low speed turnout by high speed ones to remove bottlenecks to higher speeds.

4. Removal of all permanent speed restrictions.

5. Enhancement of axle load.

6. Making bypass "city avoiding lines" for the freight operation so that bunching effect at the station does not affect freight movement.

7. Electrification of the missing links, to make long runs possible.

8. Introduction of freight time-tabling.

9. Grade separation between freight & high speed passenger trains by laying high speed passenger lines or dedicated freight corridors.

Summary

Deployment of higher power locomotive and improving HP/TL ratio holds the key for optimum utilization of the resources for IR to meet the future challenges of freight operations. Indian Railways needs to strictly implement higher HP/TL ratio by inducting additional locomotives. In addition to this, IR needs to remove various bottlenecks to gain further from this strategy like: removal of speed restrictions, introduce high speed turnouts, electrification of missing links etc. which can be planned in the long term. The slower passenger trains also have to be replaced with EMU/MEMU as a complementary strategy to bring down the speed differentials.