

Opportunities for Capital Goods Industry with Indian Railways and Metros

Prepared for FICCI Capital Goods Committee by One A Advisors

January 2020

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preparing you for disruption

FICCI

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January 2020

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Foreword

Indian Railways is the lifeline of the country's social and economic structure. It is the world's second largest mobility system (in terms of number of passengers carried) and is growing rapidly. This massive scale and ongoing growth necessitate continuous investment in areas such as track expansion, rolling-stock upgrade and track electrification. There is an urgent need to upgrade technology for higher speed, improved passenger experience, and most importantly better safety provisions. Responding to these requirements, Indian Railways has significantly increased its annual capital expenditure from Rs. 40,000-50,000 crore to Rs. 1.3 lakh crore in the financial year 2018-19, while the budget for 2019-20 stands at Rs. 1.59 lakh crore. It is also undertaking ambitious projects such as India's first high-speed rail and dedicated freight corridors. Complementing Railways, Metro projects in multiple cities are under expansion, construction or planning stage. All these put together provide multiple business opportunities to industry players.

This study initiated by the FICCI Capital Goods Committee focuses on three categories of opportunities – (a) rolling-stock/sub-assemblies (b) machinery/tools and (c) project execution/construction. These areas constitute nearly three-fourths of the total spend. The study identifies and details specific opportunities in each of these areas.

A critical input to the study was the 'voice of industry' survey. Twenty-plus industry players provided feedback on doing business with Railways and Metros. They expressed eagerness to pursue opportunities with Railways and Metros with many targeting more than doubling of business over the next five years. They also appreciated transparency in bidding and tendering processes. However, they raised pain-points **on procurement policy and processes** e.g., lack of long-term business assurance, factors impeding indigenization, multiplicity of interface agencies, one-sided contracts and inefficient invoicing process.

Railways and Metros can thus provide substantial business opportunities to industry and play a critical role in 'Make in India' and job creation. The study estimates incremental manufacturing opportunity of Rs. 28,000 crore per annum for Indian Capital Goods players through implementation of the recommendations. This will generate about 70,000 direct manufacturing jobs and 7 lakh total jobs, including indirect and induced jobs. On project execution side, successfully achieving targets pertaining to track construction, electrification, high speed rail and dedicated freight corridors will generate a total project execution opportunity of around Rs. 5 lakh crore for industry over the next 5-7 years. This will generate 60 to 70 lakh man-years of employment during the construction phase of these projects.

It is thus incumbent upon Railways and Metro corporations to further industry participation and facilitate industry to leverage these opportunities. This study would enhance the cooperation between Indian Railways and industry in manufacturing, particularly in the Capital Goods sector.

Shailendra Roy
Chair, FICCI Capital Goods Committee
Member of the Board & Whole-Time Director, Larsen & Toubro Limited

Acknowledgements

We express gratitude to Indian Railways and its undertakings who helped us with their perspective on the subject.

- Indian Railways (Rolling Stock Production & Maintenance Department)
- Central Organisation for Modernisation of Workshops (COFMOW)
- Dedicated Freight Corridor Corporation of India Limited
- Indian Railway Stations Development Corporation Limited
- IRCON International Limited
- Modern Coach Factory, Rai Bareli
- National High Speed Rail Corporation Limited
- Rail Vikas Nigam Limited

We are thankful to more than 15 industry players and industry bodies who participated in the 'Voice of Industry' survey and shared their feedback and suggestions regarding pursuing opportunities with Indian Railways and Metros. Industry players who participated in survey spanned across three focus categories - OEMs, machinery/tool manufacturers, and EPC players. Inputs from both large corporates (including India based manufacturing units of global players) and SME segment players were sought and incorporated in the study recommendations.

We are also thankful to Mr. Jogesh Singh Sondhi (ex-ADG, RDSO) for providing his inputs to the study.

Abhishek Agrawal
Founder, One A Advisors

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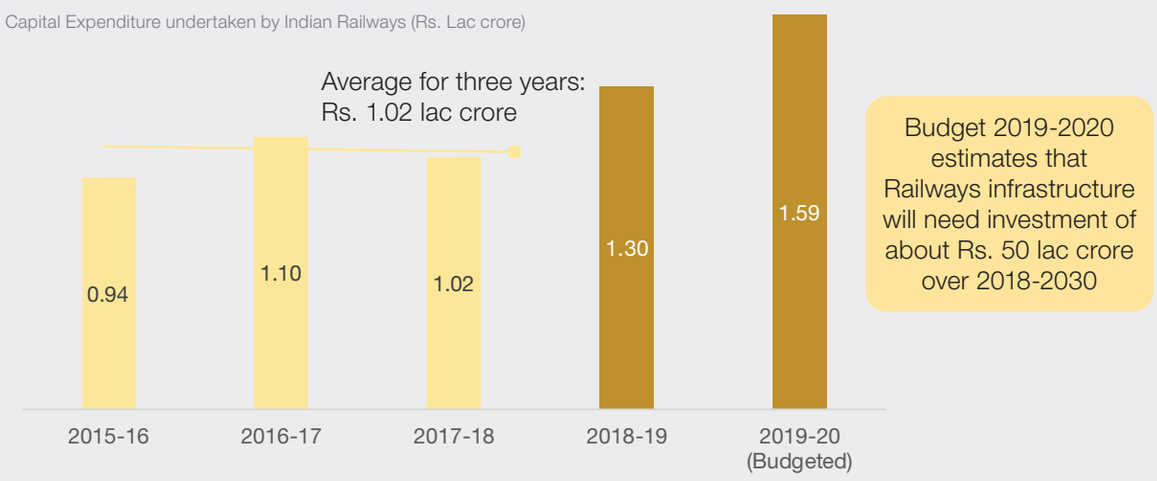
Opportunities for Capital Goods Industry with Indian Railways and Metros



Introduction

Indian Railways is core to India's economy. As world's second busiest passenger mobility system, Indian Railways carried more than 835 crore passengers in the year 2018-19[1], almost 7 crore more than in 2017-18. It also carried more than 690 billion tonne-KMs of freight[2], an increase of 2 bn tonne-KMs compared to previous year. To support this massive and growing scale of operations, Indian Railways need to continue to invest in areas such as rolling-stock upgrade, track electrification, new track laying and expansion of current tracks, station redevelopment, upgrade of signalling and communication systems etc. Thus, the capital expenditure incurred by Railways has increased multi-fold over recent years. Total capital expenditure by Indian Railways stood at Rs. 1.3 lac crore for the year 2018-19 and budgeted number for 2019-20 is Rs. 1.59 lac crore. This is a significant jump over average levels of about Rs. 1 lac crore for previous three years.

Step-jump in Capital Expenditure by Indian Railways



SOURCE: Indian Railways budget statements

Special projects such as high-speed railways and dedicated freight corridors are under execution. Indian Railways is building India's first high-speed rail network between Ahmedabad and Mumbai with an accelerated target of dedicating it to nation on 15th August 2022. With an estimated budget of Rs. 1.1 lac crore, this is an ambitious project and will be a leapfrog in terms of traction speed of Indian Railways.

Indian Railways is constructing two dedicated freight corridors – Western corridor (1504 KMs, Dadri in Uttar Pradesh to Mumbai in Maharashtra[3]) and Eastern corridor (1856 KMs, Sanehwal in Punjab to Dankuni in West Bengal). Built with an investment of USD 12 billion, these corridors hold potential to transform India's freight logistics through providing 2.5-3x faster mobility on these routes compared to current speeds for goods trains[4]. December 2021 is the targeted commissioning timeline for both these corridors. In addition to these two corridors, planning for three more corridors is underway. These are East-West corridor, North-South corridor, East coast corridor.

Metro trains heralded a step-change in urban mobility in India. India now has close to 657 KMs of operational metro line[5]. There are about 15 metro railway projects under various stages of planning and construction. These projects constitute about 600 KMs of sanctioned metro lines under construction and about 1000 KMs of metro line under various stages of planning. These metro projects provide an upside to industry players participating in the sector.

All these developments present varied and large business opportunities for industry players to participate in the growth story of Indian Railways.

1. 835.4 crore; SOURCE: Budget 2019-20
2. 690.704 billion Tonne-KMs; Source: Budget 2019-20
3. Connecting to Jawaharlal Nehru Port (JNPT)
4. Current average speed of goods trains is 23.3 KM/hour (2017-18), in comparison average speed of goods trains on DFC is expected to be about 65 KM/hour
5. SOURCE: Budget 2019-20

01
Opportunity areas



1. Opportunity areas

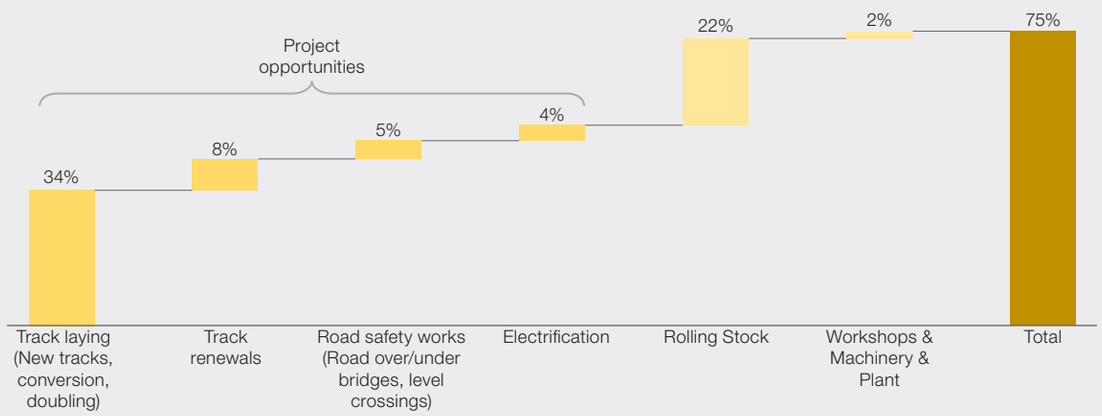
Higher capex levels by Indian Railways, developments in high-speed rail and dedicated freight corridor projects, and execution of new metro projects, all put together generate a plethora of business opportunities for industry players. For the purpose of this study, three categories of opportunities are focused on and analysed:

A. **Rolling-stock/sub-assembly opportunities:** Setting-up coach/locomotive factories for Railways and for Metros, manufacturing of various sub-assemblies of rolling-stock
B. **Machinery/tools manufacturing opportunities:** Manufacturing various capital goods (machinery and tools) for Railways and for Metros
C. **Project execution/construction opportunities:** Executing project works as EPC[6] contractor e.g., for electrification, track laying, workshop overhaul

These areas represent about three-fourth of Railways' capital expenditure plan. These are also the main spend areas for projects such as high-speed railways, dedicated freight corridors, and for Metros.

Focus opportunity areas represent about three fourth of Railways' total budgeted capital expenditure

Share in Budgeted Capital Expenditure plan by Indian Railways for 2018-19[1] (%)



1 SOURCE: INDIAN RAILWAYS BUDGET

6. Engineering, Procurement, and Construction

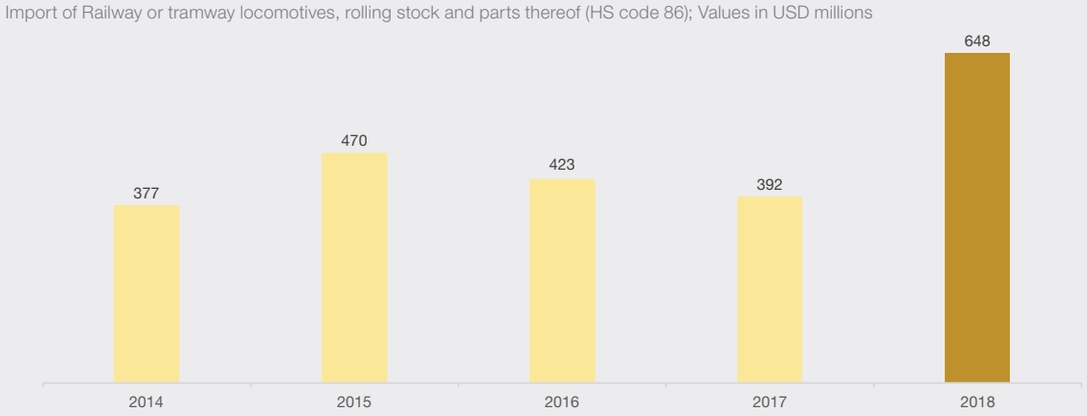
A. Rolling-stock/sub-assembly opportunities

Indian Railways' total budgeted spend for Rolling-stock for the year 2018-19 stood at Rs. 32,007 crore across coaches, locomotives, and freight wagons. Indian Railways primarily rely on own Production Units (PUs) for rolling-stock assembly, other than for freight wagons which are largely procured from industry. Sub-assemblies for coaches and locomotives are sourced from industry players. Only in 2015 it formed two JVs with industry players for manufacturing rolling-stock in the PPP mode. Metro corporations, on the other hand, procure rolling-stock directly from industry players who in turn manufacture or source sub-assemblies from tier-2 players.

Both Railways and various Metros have focused on indigenisation of rolling-stock in recent years. Significant further scope of indigenising rolling-stock still exists. India imported close to USD 650 million worth of Railway rolling stock and parts in 2018. In fact, this was more than 1.5 times average for previous four years. Driver behind increase is faster execution of projects while local industry is still not fully ramped-up. Hence, with ramping-up of local manufacturing capacities imports should come down in near future.

Rolling-stock imports spiked in 2018

Import of Railway or tramway locomotives, rolling stock and parts thereof (HS code 86); Values in USD millions



SOURCE: ITC TRADE MAP; ANALYSIS BY ONE A ADVISORS

A1. Passenger coaches

Indian Railways is undertaking a massive rolling-stock upgradation program. This involves both expanding number of coaches in use and replacing existing stock of about 60,000 old technology ICF coaches to the new technology LHB (Linke Hoffman Busch) technology coaches. LHB coaches offer better safety feature, are more compatible with semi high-speed rail tractions, and provide a more comfortable travel experience.

Put together, this presents an opportunity of about 6,000 coaches per year over next 10 years. Roughly 2000 could be for net new introduction[7] and 4,000 for replacement of ICF coaches to LHB coaches[8]. Industry players will have opportunities to supply various assemblies and components to Railway Production units for these coaches. These include,

a. **Profile cut components through laser cutting machines:** The requirement for such components (made of stainless steel/corrosion resistant steel) in LHB coaches is roughly 2.5 tonnes per coach. At present approximately 60% of profile cut component are outsourced, as production increases the requirement of Profiled component will also increase
b. **Sub-assemblies of coach** e.g., side/end wall, roof, under frame, bogie frame, bogie bolster
c. **Roof mounted air conditioning systems**
d. **Electric panels, FRP panels and harness**

7. Projecting forward from last 5 years net new coach addition rate of 1808 coaches p.a. (2011-12 to 2017-18)
8. To replace about 40,000 ICF coaches over a 10 years

Requirement of these components over next 5 years will increase to 2-2.5x of current requirement in line with capacity expansion plans of Railways workshops.

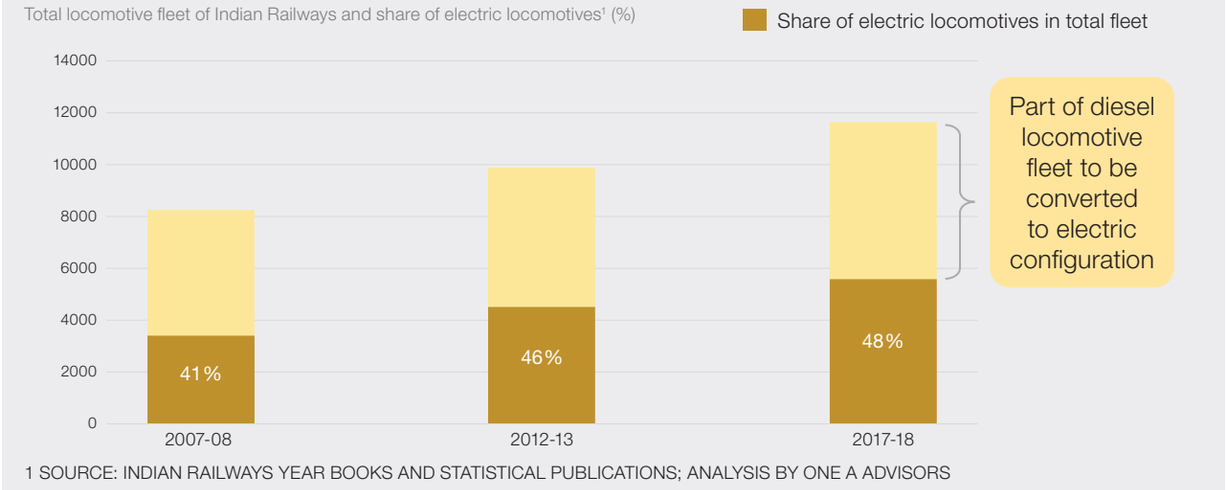
Some of the Production Units are also planning to set-up a rail ancillary park to house assembly/component manufacturing units in these parks. Specifically, Modern Coach Factory (MCF) is finalising planning for such a park with an investment of Rs. 1300 crore. Players in the MSME category should look to capture benefits of housing their production in these parks.
There could also be an opportunity to set-up a new coach production unit in PPP model with Indian Railways were Indian Railways to ramp-up production of coaches with support from industry players.

A2. Locomotives

Indian Railways run a fleet of close to 12,000 locomotives, roughly half each of diesel and electric technologies. It has been adding close to 400 locomotives per annum to its fleet over last five years. Target taken by Indian Railways going forward is to produce 725 electrical locomotives each through financial year 2019-20, 2020-21, and 2021-22[9]. Focus will be on increasing share of electric locomotives, in line with its objective to achieve 100% electrification of broad-gauge tracks by 2021-22.

In addition to own Production facilities, Indian Railways is setting up two locomotive factories under PPP model with private manufacturers[10]. These are expected to supply about 1,800 locomotives over 10 years.
Railways is also innovating to convert a portion of its fleet of diesel locomotives to electric over this time period. It achieved first of its kind diesel to electric locomotive conversion in February 2018.

Indian Railways has been increasing share of electric locomotives in its fleet



1 SOURCE: INDIAN RAILWAYS YEAR BOOKS AND STATISTICAL PUBLICATIONS; ANALYSIS BY ONE A ADVISORS

New locomotive production and conversion present an opportunity for manufacturers of components/assemblies for locomotives e.g.,

a. Electromechanical subassemblies e.g., braking systems, propulsion systems
b. Electrical component suppliers e.g., traction motors, rectifiers
c. Castings and forgings e.g., bogie frames, axle, and wheelsets

They could supply either to Locomotive Production Units of Railways[11] or to industry players setting-up locomotive manufacturing units under the PPP model.

9. Source: Production Programmes of Production Units, Indian Railways
10. General Electric and ALSTOM
11. Chittaranjan Locomotive Works, Diesel Locomotive Works

A3. Metro coaches

As mentioned earlier, there are about 600 KMs of sanctioned metro lines under construction and about 1,000 KMs of metro line under various stages of planning. There will be requirement of metro coaches for these new lines in addition to replacement demand for existing metro lines. Industry expects demand for metro coaches to reach about 700-800 coaches per annum[12]. This will amount to about Rs. 6,000 crore of annual metro coach production opportunity[13]. There is an opportunity to increase share of local value-addition in Metro coaches. As per various industry estimates, average share of local content across industry currently stands at 30-50%. Public procurement guidelines[14] already specify minimum 50 per cent local content in purchase of rolling stock by metro corporations. While rolling-stock players are working towards increasing local content, further scope of indigenisation exists for many sub-assemblies such as **propulsion systems, wheelsets, signalling and communication systems, and some of the critical electrical fittings.**

Further, industry players can develop India manufacturing centres as hub for global demand. Many rolling stock manufacturers already serve global rolling-stock requirements through their India manufacturing units.

A4. Freight wagons

Freight segment is critical to Railway's financial health and as such contributes nearly two-third to gross earnings of the carrier[15]. Railways is further targeting a substantial increase in its modal share in freight transport. It is executing the two dedicated freight corridors towards this objective. This will generate need for additional wagons for its goods trains. Freight wagon manufacturing has largely been already outsourced by Indian Railways. Industry players however are suffering from state of over-capacity in the industry. Railways acquired 12,000 wagons in the year 2017-18. Industry capacity is roughly double of this at 20,000 – 25,000 wagons per annum.

Dedicated freight corridor projects will provide an upside and new business opportunities to wagon manufacturing players. Requirement across first two corridors alone is expected to be about 240 trains. There will also be design improvement in terms of axle weight of 25 tonnes compared to currently used 22.9 tonnes. In future business models of wagon leasing to Indian Railways and their agencies could also emerge.

12. Based on interviews with industry players
13. Using benchmark of approx. Rs. 8 crore/coach, for mid-point demand estimate of 750 coaches per annum
14. Public Procurement (Preference to Make in India), Order 2017
15. In 2017-18, goods earnings contributed Rs. 1.17 lac crore (rounded) in 2017-18 the gross earnings of Rs. 1.79 lac crore (rounded) of Indian Railways

B. Machinery/tools manufacturing opportunities

B1. Track machinery

Indian Railways is aggressively expanding track network. Target for 2018-19 stood at 4,100 KMs of tracks. This includes 2100 KMs of track doubling and 1000 KMs each of new tracks and gauge conversion. Indian Railways is also mechanising track maintenance, targeting full mechanisation of inspection and maintenance activities by the year 2024[16].

This calls for induction of,

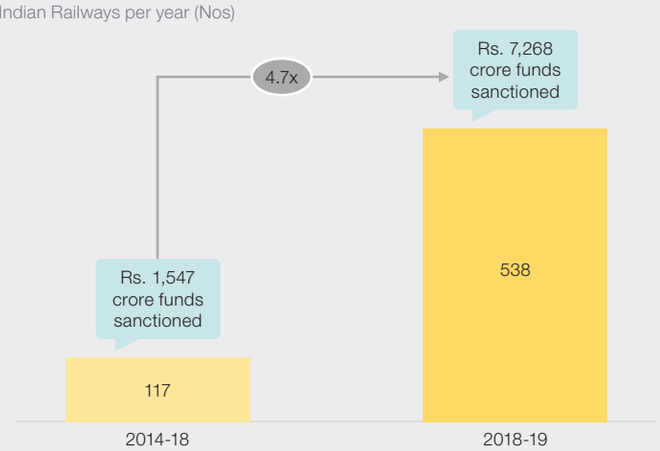
a. **On track maintenance machines** such as track tamping machines, ballast cleaning machines, points and crossings tamping machines
b. **Track renewal and laying/relaying machines** such as track relaying train, turnout laying machine, points and crossing changing machines.
c. **Mobile maintenance units (MMUs)** which typically consist of a road vehicle, rail borne maintenance vehicle, utility vehicle, and multipurpose tamper

Dedicated Freight Corridor Corporation is deploying mechanised track laying using New Track Construction (NTC) machines for the first time in India. This method has productivity of 1.5 KM of track laying per day, compared to only 200 metre achieved in traditional manual method.

Overall, by 2024 Railways is targeting to nearly triple its current track machine portfolio of roughly 950 machines. A total of 538 track machines were sanctioned in 2018-19, nearly 5 times higher than average 117 machines per year sanctioned in the preceding four years. This presents an opportunity to track machinery manufacturers of the size of about Rs. 7,000 crore (funds of Rs. 7,268 crore sanctioned for 2018-19).

Demand for track machinery by Indian Railways

Track machinery sanctioned by Indian Railways per year (Nos)



SOURCE: PRESS INFORMATION BUREAU (HTTP://PIB.NIC.IN/NEWSITE/PRINTRELEASE.ASPX?RELID=186913)

Currently, only 20-25% of the track machine fleet is fully indigenised. Local content varies from 20% to 50% in the other 70% of track machine fleet[17]. Going forward, local content is being targeted to be increased to at least 50 per cent. This presents a large opportunity to Indian machinery manufacturers. They could look to enter into technology tie-up with global OEMs of these machines and indigenise production.

16. SOURCE: PIB (http://pib.nic.in/newsite/PrintRelease.aspx?relid=178463)
17. SOURCE: PIB (http://pib.nic.in/newsite/PrintRelease.aspx?relid=186913)

B2. Construction/earth-moving machinery

The new projects undertaken by Indian Railways require a massive amount of civil construction work. The two dedicated freight corridors, for example, require a total earthwork volume of 237 million cubic metre, 5684 bridges, and 109 station buildings. Similarly, all 'below the track' civil work such as construction of viaducts, bridges, tunnel and construction of stations and maintenance depots for high-speed rail will be carried out by Indian players.

This will provide business opportunity for providers of construction/ earth-moving machinery. This would typically include various types of surveying equipment, earth excavators, tipper or dumper trucks, dozer equipment, vibratory rollers, grader equipment, tunnelling equipment (various boring machines), sand washing equipment, concrete mixers, concrete batching and mixing plants[18].

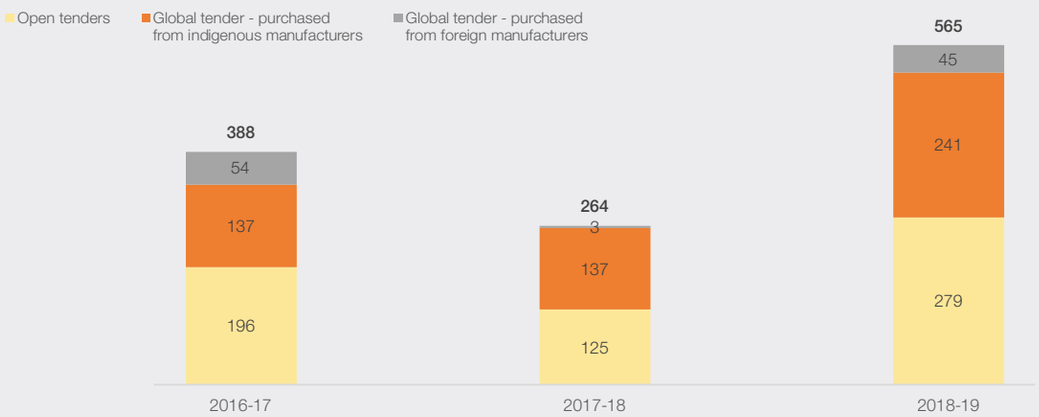
Most of the sales of this machinery will be to EPC players engaged by Indian Railways or their agencies to execute the works.

B3. Machinery and tools for Railways Production Units

Railways' Production Units require machinery and machine tools for their manufacturing activities. Central Organisation for Modernisation of Workshops (COFMOW) operates as Railways' procurement unit for machinery and tools. It procured Rs. 565 crore worth of machinery in the year 2018-19. and has a 'throw-forward' of about Rs. 2,100 crore. Going forward, it plans to increase its machinery buying to Rs. 800 crore per annum.

Procurement of machinery by COFMOW

Machinery procured by COFMOW through open tenders and global tenders (Rs. crore)



SOURCE: COFMOW; ANALYSIS BY ONE A ADVISORS

18. SOURCE: Compendium of Construction Equipment, published by RDSO, Ministry of Railways

Typical machines required include[19],

a. **Wheel shop machines** such as surface wheel lathes, wheel press, vertical turret lathe, axle turning lathe, axle grinding machine, wheel balancing machine
b. **Robotic machines such as robotic welding machines for coach bogies**
c. **Material handling equipment** such EOT cranes, traversers, stackers
d. **Special purpose machines** such as horizontal boring/drilling/milling machines, machining centres
e. **Metal forming machines** such as hydraulics and mechanical presses, press brakes, pipe bending machines
f. **Metal cutting machines** such as laser cutting machines, oxy/plasma profile cutting machine
g. **Welding machines**
h. **Surface preparation machines** such as sand/shot blasting, painting system
i. **Various furnaces, boilers, incinerators, and filtration plants**
j. Others including electrical machines, grinding/polishing machines, straightening/levelling machines etc.

While many of the machines are indigenised, there is scope for indigenisation of fixe/six axis machines, traveling column machines, surface wheel lathe, underfloor wheel lathe, robotics, and automation solutions.

B4. Machinery and equipment for Signalling and control

Budgeted expenditure for signalling and telecommunication works stood at Rs. 1,750 crore for 2019-20. Going forward, however it could see a steep increase if a full roll-out of advanced signalling and control system is carried out across the entire network of 60,000 route-KMs. Initial estimates of this massive upgrades are about Rs. 75,000 crore.

This will provide opportunities for suppliers of signalling and communication equipment and machinery manufacturers. **Equipment and machinery opportunity here include electronic signalling and interlocking machinery, train control equipment, digital axle counters, train management and diagnostic systems, and other instruments required for train control.** Manufacturers will also have ongoing maintenance and service business opportunity for these equipment.

There exists a large scope for indigenisation of most of these equipment. Acquisition or transfer of technology is key to achieve this objective. This could happen through global technology players setting-up Indian manufacturing assets. Indian players could also enter into technology partnerships with global OEMs for these equipment and set-up manufacturing assets in India. Signalling and control equipment is also one of the major import item for metro projects. Supplying to metro projects thus could provide additional upside to domestic manufacturers of these equipment. It should be noted though that technology sophistication level for Metro signalling and control systems is much more stringent.

19. SOURCE: Inputs from COFMOW

C. Project execution/construction opportunities

C1. Electrification opportunity

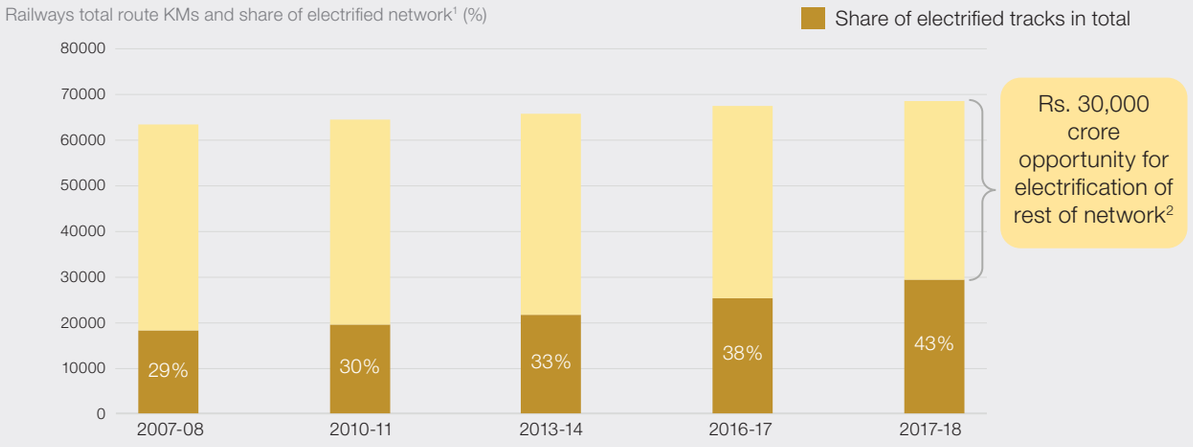
Currently about 2/3rd of freight and half of passenger traffic moves on electric traction. Indian Railways is moving towards target of 100% electrification by 2021-22[20] . This has multiple benefits in terms of savings in fuel cost, improved safety, higher speeds, and lower emissions.

In terms of opportunity for industry players, this means about 30,000 route-KMs of electrification projects, amounting to project work of about Rs. 30,000 crore[21]. Considering the target of achieving this by 2021-22, potential is there for Rs. 10,000 crore per annum project execution opportunity for industry players. Actual spend though needs to pick-up pace - achievement in 2018-19 was about 6,000 route-KMs.

This will provide opportunities to,

a. **EPC players** with electrification project execution expertise and,
b. **Suppliers of electrification equipment and components** such as fabricated and galvanized steel structures, transformers, porcelain and composite insulators, fittings for OHE (Over Head Equipment), fittings for sub-stations and for transmission lines, AC control panels, contact and catenary wires, various other wires such as dropper wires, jumper wires, and various other OHE and PSI (Power Supply Installation) equipment[22].

Railway electrification presents a substantial opportunity to infrastructure firms



1 SOURCE: INDIAN RAILWAYS YEAR BOOKS AND STATISTICAL PUBLICATIONS; ANALYSIS BY ONE A ADVISORS
2 AT APPROXIMATE BENCHMARK OF RS. 1 CR PER ROUTE KM OF ELECTRIFICATION

20. SOURCE: PIB (http://pib.nic.in/newsite/PrintRelease.aspx?relid=183399)
21. Using rough benchmark of Rs. 1 crore per route-KM
22. SOURCE: Guidelines for General procedure for enlistment of firms as CORE approved manufacturers for Electric items, Revision No. 2, published by Central Organisation for Railway Electrification

C2. Track laying/civil construction

As noted earlier, Indian Railways is aiming to significantly enhance track capacity with 4,100 KMs of track laying targeted for 2018-19[23]. This presents an annual opportunity of close to Rs. 35,000 crore for infrastructure firms (funds of Rs. 34,835 crore sanctioned for the year 2018-19)[24].
Green-field and brown-field metro projects will provide further track layout and civil construction opportunities. Many of these will be underground and hence more complex and of higher contract value than Indian Railways. High-speed rail project and the two dedicated freight corridors being executed, and future ones being planned entail massive amount of civil work. As noted earlier, the two dedicated freight corridors will require a total earthwork volume of 237 million cubic metre, 5,684 bridges, and 109 station buildings. Similarly, all 'below track' civil work such as construction of viaducts, bridges, tunnel and construction of stations and maintenance depots for high-speed rail will be carried out by Indian players.

This provides opportunities both for the main EPC contractor and for various sub-contractors that these tier-1 EPC players will engage for the works.

C3. Station redevelopment projects

Indian Railways plans to redevelop 600 stations, entailing an investment of about Rs. 1 lac crore. Initial progress on this front has been slow due to muted response by industry players for the proposed PPP model to develop stations. Recently introduced changes are expected to provide a fillip to developments. These changes include appointment of nodal agency for station redevelopment (Indian Railway Stations Development Corporation or IRSDC), longer lease periods of up to 99 years for developers, allowing multiple sub-leasing, allowing residential development, and simplified bidding procedures. IRSDC is planning to tap investment from private equity investors and pension funds for the initial pool of 10 stations, totalling to about Rs. 2,500 – 3,000 crore.

Industry players will have EPC opportunities for redevelopment of these stations.

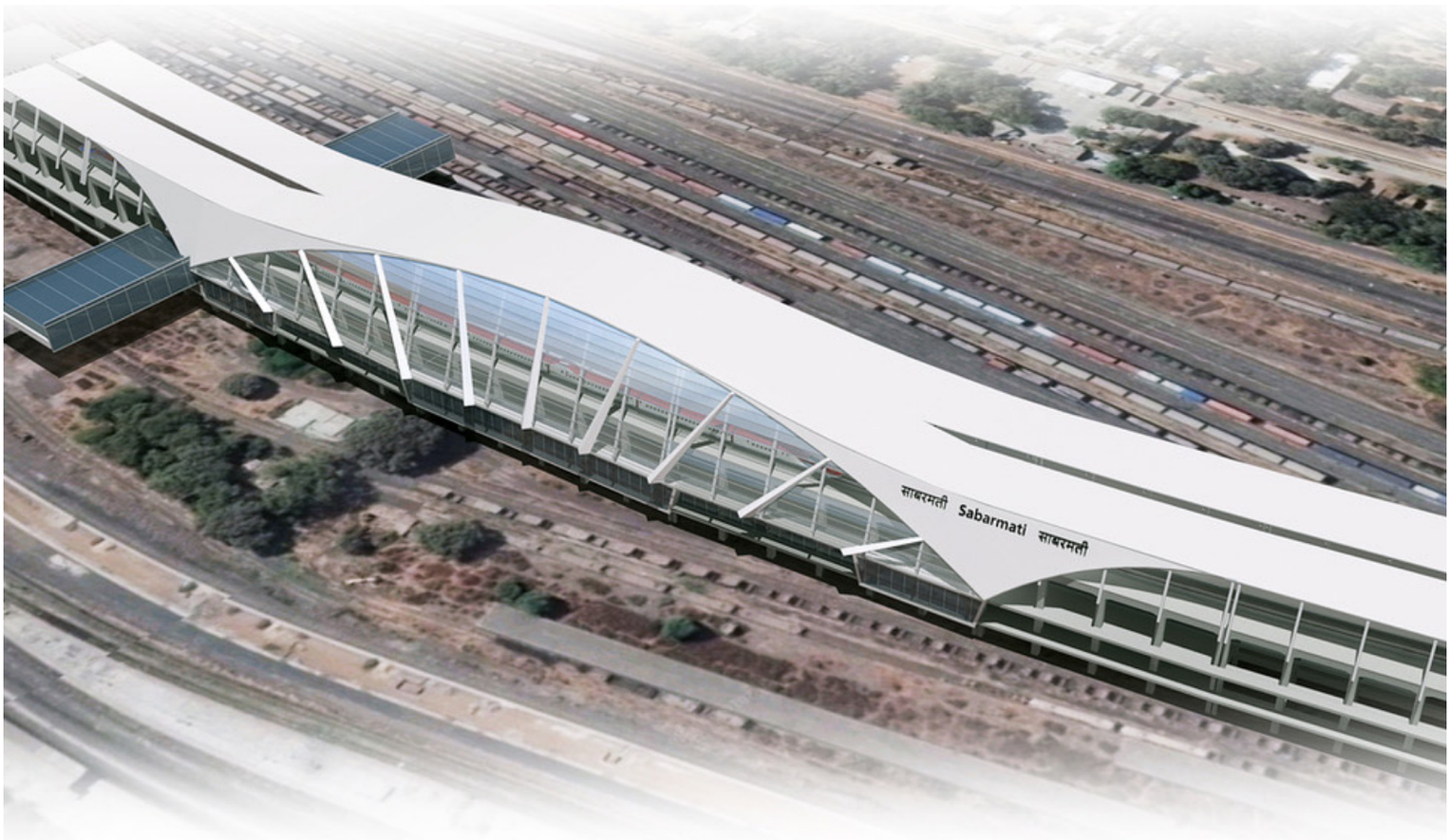
C4. Workshop modernisation and capacity augmentation

Indian Railways is aggressively ramping-up capacity of its internal production unit to fast-track achievement of objectives such as replacement of old ICF coaches with LHB technology coaches and substantially increase share of electric locomotives in total fleet.

For example, work is under progress to increase capacity of Integral Coach Factory from 1,700 to 2,500 coaches per annum[25]. Modern Coach Factory is looking to augment capacity from 1,000 coaches per annum currently to 2,000 coaches per annum (already sanctioned), and subsequently to 5,000 coaches per annum (proposed)[26]. Each of such expansions will provide a project execution opportunity of about Rs. 500 crore to industry players.

23. Target of 4,100 KMs track laying for 2018-19, comprising 1,000 KMs of new line construction, 1,000 KMs of gauge conversion, and 2,100 KMs of line doubling
24. SOURCE: PIB (http://pib.nic.in/newsite/PrintRelease.aspx?relid=186913)
25. SOURCE: PIB (http://pib.nic.in/newsite/PrintRelease.aspx?relid=186913)
26. SOURCE: Inputs from Production Unit

02
‘Voice of Industry’

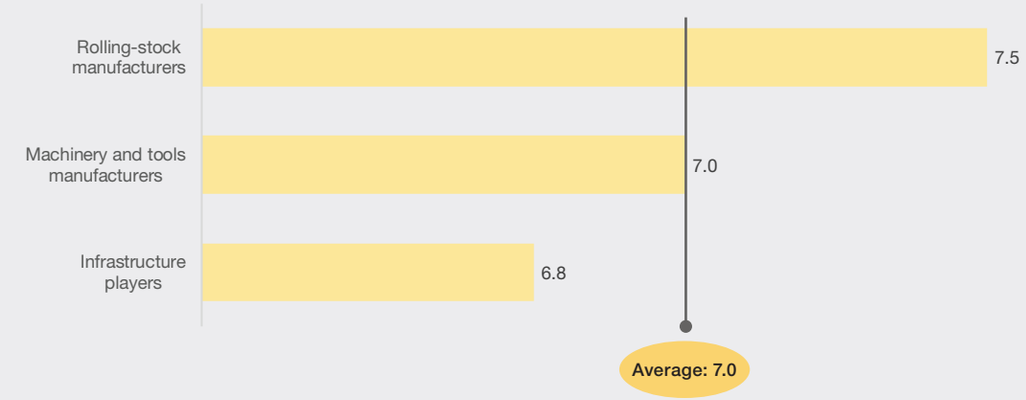


2. 'Voice of Industry'

A 'voice of industry' survey was carried with industry players who are pursuing or are interested in exploring business opportunities with Indian Railways and Metro corporations. Industry's level of satisfaction with Indian Railways though has been broadly positive with an average score of 7 out of 10, though satisfaction levels vary across player categories. Metros fared slightly better in comparison with an average score of 7.3 out of 10 on same parameter.

Average levels of satisfaction with 'Indian Railways as customer'

Score (out of 10) on survey question "What has been your level of satisfaction with Indian Railways as your customer?"



SOURCE: 'VOICE OF INDUSTRY' SURVEY; ANALYSIS BY ONE A ADVISORS

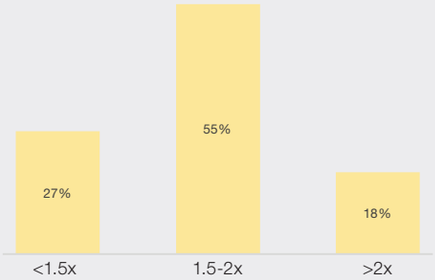
Areas of appreciation

Industry expressed high levels of enthusiasm in pursuing opportunities with Railways and Metros, with many players targeting more than doubling their Railways and Metro business in next five years. Industry recognizes the step-jump in investments being made and expect to grow their business with Railways and Metros accordingly. Industry expressed their willingness to participate more intensively with Railways on its priorities such as coach modernisation, locomotive upgrades (diesel to electric), electrification.

Large size of opportunity provided by Railways and Metros is particularly attractive for industry players. There is a continuity in business requirement due to repeat nature of business from Railways. Also, Railway business is less cyclical compared to other industries and helps industry players beat the downturn in other sectors.

Expectations from Railways and Metro business growth

Response to question: How do you see your organisation's Railways/Metro business growing over next 5 years from current levels?
% of respondents



SOURCE: 'VOICE OF INDUSTRY' SURVEY; ANALYSIS BY ONE A ADVISORS

Industry appreciated the transparency and objectivity of procurement policies. For example, availability of all policies in public domain helps in maintaining transparency of procurement. Tendering and bidding processes are seen as transparent. Industry also lauded adoption of e-platform for most of procurement activities, further improving transparency of bidding processes. Industry believes that Railways and Metros use set standards of quality and testing.

Industry appreciated availability of elaborate technical specifications for industry players to study and use for their design and manufacturing. Industry players generally expressed reasonable levels of familiarity with Indian Railways' procurement policies and processes[27].

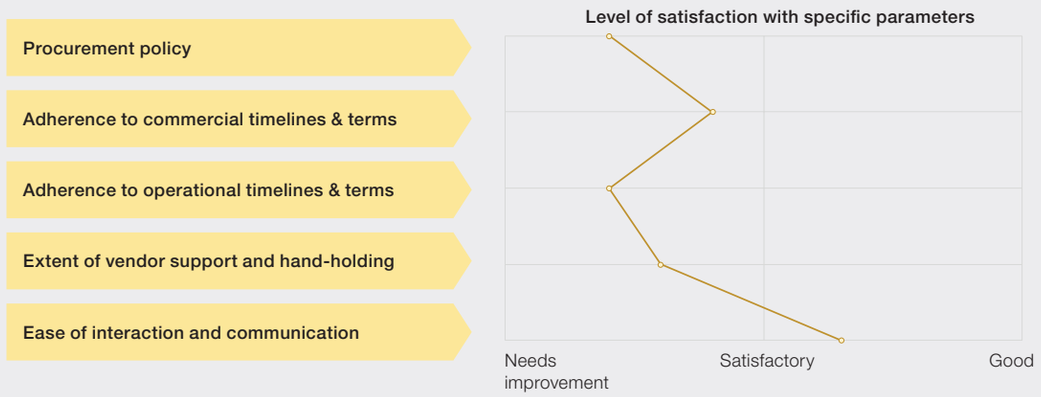
Security of payments and opportunity to work on technically challenging requirements were identified other positives of working with Railways and Metros. Some of the recent steps to ease liquidity situation e.g., providing Letter of credit to suppliers/contractors to avail bank credit were appreciated.
Industry players also expressed high levels of interest in pursuing opportunities with high-speed rail and dedicated freight corridors[28]. Industry gave positive feedback to changes being undertaken in these projects such as larger packages instead of fragmenting across many smaller packages. This allows better accountability, feasibility of higher mechanisation and introducing other modern construction techniques[29], and more efficiencies in execution. Allowing players to bid in consortium allows small and mid-sized players to participate in these opportunities as well. Contracting reforms taken to ease cash-flows for contractors are also welcomed by industry. These include steps such as providing interest free mobilisation advance, not deducting mobilisation advance and retention money simultaneously[30].

Pain-points

Procurement policy, contracting, and processes emerged as aspects needing most attention.

Specific areas of improvement identified by industry

Score (out of 10) on survey question "What has been your level of satisfaction with Indian Railways as your customer?"



SOURCE: 'VOICE OF INDUSTRY' SURVEY; ANALYSIS BY ONE A ADVISORS

27. Average score of 3.8 on 5 point scale
28. Average score of 4.5/5 and 4.4/5 on level of excitement to pursue opportunities with high-speed rail and with dedicated freight corridors respectively
29. Such as pre-cast cable ducts, seismic arrestors
30. Retention money deducted until first 30 per cent of project execution, mobilisation advance deducted only after 30 per cent of execution

Regarding procurement policy, participants voiced lack of long-term contracts primary hindrance for investing in manufacturing facilities for Railways. Industry players do not get sufficient orders after setting-up Railways/Metro specific infrastructure. Annual procurement cycle which is based strictly on lowest cost bid (amongst technically qualified bidders) leaves them exposed to high variability in orders from Railways. Some of them are suffering from less than even 10% capacity utilisation for their Railways facilities as new players enter in certain years and price very aggressively to win the contract.

Industry voiced a pressing need for reforming commercial contracts used by Indian Railways and Metros. Most of the contracts have one-sided clauses e.g., flexibility provided to buyer (Railways) to modify procurement volumes by up to 30 per cent from original contract. For infrastructure execution contracts, most of the risk is passed onto EPC player without adequate compensation for scope changes or time delays for factors outside control of contractors such as not getting access to site in time. Basis of reference/schedules of rates is often outdated, not reflecting current market levels. Onerous contract conditions such as simultaneous deduction of mobilisation advance and retention money make cash-flows negative in early stages of project execution.

Industry also expressed dissatisfaction at frequent cancellations and retendering particularly for large projects. Many of large tenders in past were not concluded due to various reasons. Industry though ends-up spending precious resources in bid preparation.

While industry appreciated the intent for indigenisation by Railways, it has voiced that procedures and practices being followed inhibit the pace of indigenisation. Stringent criteria of 'previous supplies' impede participation of domestic players in many global contracts. Industry also voiced concern on restrictions applied on vendor selection for projects being funded through global funding agencies. Also, limited vendor base for many items leads to overloading of approved vendors and delays in project execution.

Procurement processes also needs to be reviewed and reformed. Of particular issue here is invoicing and payment process. Industry has to deal with multiple interfaces (as many as 5 or 6) to get invoices cleared. A lot of manual interventions and follow-ups are involved. So much so that many industry players have to depute one of their employees full time just to coordinate documentation amongst multiple Railways agencies that are involved. Industry has appreciated some of the recent efforts by Railways to digitise invoicing process and reduce multiple interfaces, but its on-ground implementation is yet to be effective.

While technical specifications of Indian Railways are well understood and accepted by industry, players face a challenge when it comes to technical specifications for Metro projects. Each Metro project has its own specification standards (esp for rolling stock and signalling systems) and many projects thus could be "over-specified[31]". Eligibility criteria and contract conditions also vary widely across metro projects, causing lack of clarity amongst industry players. There is also the issue of lack of design coordination between Metros and semi high-speed and high-speed rail projects.

Another pain-point voiced by industry is introduction of new technologies. Apart from resistance faced by industry players in introducing new technologies, there is critical issue of IPR protection for any new technologies proposed by industry players. There is inadequate recognition and compensation for investments done in R&D by industry players for coming up with new solutions and proprietary nature of these solutions. Industry players have faced cases when proprietary specifications for bringing a new solution were shared broadly across industry. This led to entry of non-qualified players outbidding on cost basis and compromised on intellectual rights on the technology. Thus, incentive of bringing any new technology is very low. MSMEs voiced need for more support from Railways and agencies on Transfer of Technology (ToT) from global players for projects such as high-speed rail.

31. Using specifications which are more stringent (and hence makes parts more expensive) than what is required

Another pain point of industry is arbitration and dispute resolution process which is perceived to be lop sided in favour of buyer. Metros for example have many levels of approvals for variations, thereby delaying the approvals and payments on account of variation. Inspection process for manufacturing facilities is also felt to be inconsistent and not industry friendly.

When it comes to project execution, execution preparedness regarding access to site, arrangement of drawings is often inadequate. Similarly, for machinery supplies, handing over machinery and equipment at Railways premises is time consuming. Industry faces challenges in commissioning as at times new sheds are not ready for taking machines or site engineers are not available to commission machines in time. Industry also voiced issue of multiple interfacing agencies. For Railways, coordination between central executing agency and local units is often far from seamless. Similarly, for Metros, multiple agencies are involved in approvals and clearances.

03
Imperatives for policymakers and industry players



3A. Imperatives for policymakers

Indian Railways and Metro corporations should continue their efforts to facilitate participation of industry players in pursuing business opportunities. Below are presented study recommendations towards this cause.

Planning and strategic initiatives

Recommendation 1: Bring out a long-term perspective plan. This would be the starting point for industry to plan for Railways/Metro business and commit investments. This is especially called for projects such as semi high-speed and high-speed rail where new manufacturing assets need to be created. Taking example of high-speed railway project, this being first such project in India, local value addition in rolling-stock will be low. However, for future projects it is very much possible to gradually promote local manufacturing of rolling-stock. This would require providing visibility into long term plans for high-speed rail in India. Industry players will find it difficult to commit an investment only for one project. They need to see a clear roadmap of future projects to justify setting-up local manufacturing units. A 10/20-year perspective plan on adoption of semi high-speed and high-speed rails in the country is thus essential to start local manufacturing of rolling-stock for these projects. Indian Railways could expedite the delayed National Rail Plan to serve as this long-term perspective plan.

Recommendation 2: Introduce phased manufacturing program for high-speed rolling-stock. Indian industry needs to be incentivised to invest in capacity for high-speed rolling stock manufacturing given low numbers and lack of future visibility. This could be done through a phased manufacturing plan which supports local manufacturing of targeted components through specific duty/tax incentives. Production units set-up under this scheme could be set-up in Special Economic Zones to avail additional incentives and benefits[32]. These incentives could have sunset clause linked to sufficient development of local manufacturing capabilities.

Recommendation 3: Launch strategic partnership model for developing industry capabilities in specific areas such as aluminium based coach design for high speed operations, advanced machine tools. These are some of the areas where manufacturing eco-system doesn't exist in India currently. For an industry player to enter into technology tie-ups with global technology providers and invest in local manufacturing, it needs a long-term offtake assurance. Indian Railways could identify 'strategic partners' from existing set of industry players basis their performance and capabilities[33] (and not with strict "prior supply" conditions), work with them over a period of 4-5 years through placing development orders, and finally open these items for global competitive bidding once local capabilities are sufficiently developed. Two to three strategic partners for each critical assembly/component could be selected basis assessment of competence and competitive bidding. MSME players showing excellent track record even in related areas such as manufacturing for defence should be encouraged for transfer of technology from global players under this program.

32. These units would benefit from the proposed Employment and Economic Enclaves (3Es) framework for Special Economic Zones in India (http://sezindia.nic.in/upload/latestnews/5c401a4291212Circular.pdf)
33. Such as ability to imbibe new technology, delivery record also considering non-Railway projects

Procurement

Recommendation 4: Introduce reforms in procurement policy. Three particular reforms are suggested, First suggestion related to procurement policy is to consider longer term say **three-year contracts, reviewed mid-term after 1.5 years,** instead of annual contracting cycle. This will allow industry players a bare minimum time to recover part of upfront investment. Vendor performance could be reviewed mid-term after 18 months, and if not found satisfactory, fresh bids could be invited. This would thus also minimise risk of non-performance of vendor from Indian Railways' perspective.

Second, Indian Railways should weigh-in technical/quality aspect for vendor selection for procuring assemblies and components. Railways follows largely L1 (lowest cost among technically qualified bidders) method. There is a known phenomenon of new entrants under-quoting on price only to "get in" without meeting global standards of quality. Further, the L1 method disincentivise investments on part of industry players into improving quality beyond what is minimum accepted level. Railways could evaluate adopting **QCBS (Quality and Cost Based Selection[34]) method or "evaluated lowest bid[35]" method** for procuring some of the critical assemblies and components. A competent and independent panel could be used for ascertaining quality scores. Overarching objective of this change shouldn't be to discourage entry of new players, but on the contrary encourage entry of new players who could out-compete incumbents on quality. Railways would also need to seek corresponding modification in public procurement policy to incorporate this method of evaluation[36].

Even if it were to continue using L1 method, the cost considered however in most of the cases is only upfront cost and not lifecycle cost. For many of the sub-components and assemblies, present value of their operating cost could be much higher than the upfront cost. For such components and assemblies, Railways could incorporate quality/ technical consideration in vendor selection through **life cycle costing (factoring in both operating cost and upfront cost).** A competent and independent panel could be used for ascertaining life cycle cost. This model will pave way for **Railways and Metro corporation to start procuring some of the components on 'opex' model rather than upfront 'capex' model.** This would be in line with trend globally to reduce capex. Especially some of heavy capital investment items could be procured on "pay as you go" basis. For example, air compressors could be engaged on basis of cost of compressed air supplied. This will encourage suppliers who have a more efficient solution on life cycle cost basis as opposed to those bidding on low upfront cost, followed by high running costs.

Third, both Railways and Metro corporations should **move towards larger package sizes** to ensure more accountability, efficient execution, and use of more technology and mechanisation. Fragmenting packages to too small a size discourages competent players to participate and if selected bring in best construction technologies and methods. **Consortiums should be allowed** and even encouraged to facilitate participation of smaller contractors.

Recommendation 5: Redesign procurement contracts: As noted earlier, contracts done by both Indian Railways and Metro corporations could at times be "one-sided" and tend to pass on entire risk to EPC player. For example, 'option clause' in many contracts allows Railways to modify the agreed the procured quantity by +/30% which may lead to substantial variability for supplier who would have planned capacities considering base volume. Also, there is inadequate compensation to vendors for scope changes/design modifications or delay in execution due to factors outside control of vendor e.g., not being given access to site in time. These issues could be fixed through one-time calibration of its commercial contracts and terms by Indian Railways. Railways could adopt an internationally accepted contract standard such as FIDIC[37] for designing its contracts. FIDIC contracts are recognised to allocate risk fairly to the party which is best able to assume that particular risk. FIDIC contracts

34. In this method, a composite score based on cost and quality is arrived at and vendor selection is done basis this score
35. In this method, a quality score is given (basis parameters such as financial, technical, competence and past performance) and this score is used for further filtering (beyond first round of filtering based on basic technical criteria)
36. Currently Public Procurement Policy as applicable to all Government and Public Sector Unit procurement provides for L1 based evaluation
37. Fédération Internationale Des Ingénieurs-Conseils (or The International Federation of Consulting Engineers); FIDIC standard in industry refer to the family of contract templates provided by FIDIC organisation.

provides for well-defined step-by-step procedure for time and/or cost claims by either employer or contractor. Other highlight of FIDIC contracts is multi-tier dispute resolution process, with focus on amicable settlement first. Adoption of such contract standard should be in its entirety and not piecemeal adoption of certain sections. Also, supervision of contract should be done through impartial third-party engineer appointed on basis of professional experience.

Railways and Metros should ensure that Right of Way (ROW) and other statutory permissions shall be taken in advance before tendering stage itself and contractor is provided access to site from 'Day 0'. Access of site with all mandatory approvals such as environment should be provided to contractor before start of work. And delays on account of land acquisition or geotechnical reasons should be compensated for to contractor.

Railways and Metro corporations should also adopt means to ensure cash-flow doesn't become a challenge for infrastructure project contractor. They could provide interest free mobilisation advance and avoiding double deduction of retention money and mobilisation advance simultaneously. For small/medium sized contractors with strong past track record, they should be allowed to provide an aggregated Bank Guarantee across their project portfolio with Railways and Metro corporations instead of separate Bank Guarantee individually for each project. This would greatly help them deal with the liquidity crunch they face in their operations.

Recommendation 6: Reform procurement processes esp. invoicing/payment process Invoicing and payment process emerged as a key pain-point of industry. Railways should look for complete transformation of these processes. Fully digitising this process will be a good starting point. Railways could fully utilise Government's e-payment gateway toward fully digitising the invoicing process. Invoice clearing process should be automated, removing scope for personal bias with fixed clear guidelines of turnaround time for each step. Vendors should be notified on progress of their invoice and compensated for interest cost if invoice clearance takes more than stipulated time due to internal reasons. Railways/Metros should also issue complete project scope drawings along with tender documents and minimise changes post the award. Vendor should be rightfully compensated for scope changes on account of these variations. Claims for variations are often bottlenecked hence there should be fast track settlement of these claims.

Railways should also make attempts to fully leverage the Government e-Marketplace (GeM) platform. Indian Railways can improve its usage of GeM platform for procurement of machinery and even some of the standardised rolling-stock components. Industry players especially SMEs have had a positive experience of doing business on GeM for its user friendliness and transparency. Indian Railways should encourage its suppliers to move to GeM and promote as much procurement as possible from this platform. This will also help Indian Railways reduce its own procurement cost through promoting more competition and reducing administrative expenses related to procurement process.

Technical specifications

Recommendation 7: Harmonise approach to fix technical specifications and eligibility criteria across metro projects. Industry players find it difficult to deal with lack of standardised approach to determine technical specifications, inconsistent eligibility criteria, and varying contract conditions across Metro projects. Lack of standardisation also leads to the issue of over-specification in certain projects. Various studies and guidelines issued time to time by Ministry of Housing and Urban Affairs (MHUA)[38] could act as starting point towards this. MHUA can undertake to update and consolidate these to factor in recent advancements in technology and more importantly act as or appoint nodal agency to maximise implementation of these guidelines.

Also, it would be prudent to harmonise standards and some of the design parameters of Metros with the high-speed railways. As noted previously, lower volumes and lack of visibility into future projects is major roadblock for indigenisation of rolling-stock of high-speed railways. Harmonising technologies for Metro coaches and high-speed railways will address this issue. Metro could provide base demand for industry players while demand from high-speed railways could be additional.

Recommendation 8: Set-up joint taskforces with industry to enable more effective absorption of technology and continually review and upgrade technical specifications. Eventually development of technical specifications and standards for Railways components should be led by industry. For this purpose, joint taskforces between Indian Railways and various industry bodies could be set-up. Approval process for introducing new technology should be reviewed to promote faster absorption of technology proposed by industry and with strong IPR protection for original technology providers. Railways could also reach out to industry more pro-actively, engaging them and making them aware on steps and initiatives being taken to facilitate industry participation. Eventual aim should to be have industry self-certify standard components with minimal double check needed from Indian Railways. In Europe for example, UNIFE (the association of the European rail industry) coordinates the inputs of the rail supply industry. UNIFE's standard and regulation activities support harmonisation and transparency of technical rules in Europe in order to facilitate the development and authorisation of rail products in Europe[39]. Research Design and Standards Organisation (RDSO) of Indian Railways can be the nodal agency in India to specify standards against which industry players will provide self-certification.

Project execution

Recommendation 9: Empanel more manufacturing/project execution agencies. Railways is taking ambitious targets and doing robust planning of many project initiatives. Execution of the plan will require a wider participation from industry over and beyond Railways' in-house agencies. Indian Railways could engage more manufacturing assets and project execution agencies to meet its targets.

For example, on electrification of tracks, targets for coming years are even quite stretched starting with 10,319 route-KMs for 2019-20 (revised upwards from earlier target of 7,000 route-KMs), more than 70 per cent higher than achievement in 2018-19 of about 6,000 route-KMs. Currently five agencies are empanelled but 71% of target lies with one agency[40]. A more diverse and balanced set of execution agencies will help the cause here. Some of the qualified private players could also be included in panel.

Similarly, for faster upgradation of IHB coaches to LHB type, Indian Railways should engage non-captive coach manufacturing facilities. With the current production of about 4,000 LHB coaches by Railways own production

38. https://www.niti.gov.in/writereaddata/files/DOC0001.pdf
39. SOURCE: UNIFE website (http://unife.org/component/topic/topic/31.html)
40. SOURCE: RailPost (https://www.railpost.in/electrification-targets-for-2019-20-set-at-10319-km/)

units, it could take more than a decade to upgrade entire fleet of about 40,000 older technology ICF coaches. With involvement of industry players, this could be brought down to less than 5 years. Many of the industry players in past have invested into manufacturing assets for Railways/Metros that had to be diverted to other uses due to lack of order flow from Railways as expected. Industry players are interested in deploying these assets back for manufacturing for Railways if there is visibility for sustained order flows in future.

For tier-2 manufacturers as well, Indian Railways should focus on expanding supply-chain through approving more vendors. Building this supply-chain is critical to support ambitious targets taken on electrification, coach modernisation, and locomotive upgrades. Railways can become more practical in its approach towards allowing alternate sub-vendors considering the sudden jump in the requirement of components.

Recommendation 10: Extend PPP model to more areas. It is estimated that Railways infrastructure will need investment of about Rs. 50 lac crore over 2018-2030. Even with higher capital outlay (budgeted Rs. 1.59 lac crore for 2019-20), Government resources alone can't meet this requirement. Attracting investments via Public Private Partnership (PPP) mode is what needs to be done. Indian Railways has made a start here through two locomotive factories it is setting-up under PPP mode. Indian Railways could look to further extend PPP model for setting-up new coach and locomotive factories. This will allow it to reduce on own capex requirement, will provide demand assurance to private players, and facilitate use of latest available rolling-stock technologies.

PPP model could be extended to infrastructure projects especially electrification and other power supply infrastructure such as substations. Under this model, developers could be selected through a Tarif Based Competitive Bidding (TBCB) model. This is already well established in broader power transmission sector. PPP model should be used in station redevelopment as well after establishing 'proof of concept' for initial 15-20 stations developed on EPC basis. The PPP model should have balance of risk sharing between Railways and developer and potential for developer to earn an upside commensurate to risk being taken.

3B. Imperatives for industry players

Planning and strategy

Recommendation 1: De-risk business models from over-reliance on Indian Railways orders. Business model and planning based only on Indian Railways are prone to volatility as Railways orders tend to be 'lumpy' in nature. Industry players should adopt business model where they de-risk lack of orders from Railways through alternative sources such as exports or manufacturing for other industries such as defence. Rolling-stock players could look to develop their Indian manufacturing units as hub for global production.

Recommendation 2: Forge effective partnerships. Indian players should look to collaborate with global players to form technology transfer partnerships. They could also form JVs or SPVs with other industry players to bid for PPP projects and undertake new investments. Construction players could partner with their global peers to bring in latest technologies to the country for projects like high-speed rail. Though these partnerships, global OEMs should invest in manufacturing in India for Indian Railways and Metro projects and also for their global requirements.

Technical specifications

Recommendation 3: Promote self-certification of parts. A common friction point between industry and Indian Railways is quality inspections and checks which end-up consuming a lot of time from both parties. It often leads to disagreements, and inefficiencies and delay in procurement. To overcome this issue, industry should work towards institutionalising a robust and reliable self-certification practice, at-least for non-safety critical components. This will eliminate a layer of business friction between industry players and Railways and help improve the consciousness for quality culture among industry players. This recommendation is linked to recommendation 8 for policymakers which calls for specifying self-certification standards through RDSO.

Recommendation 4: Pro-actively work with Indian railways to define and upgrade technical specifications time to time. Indian Railways and its Production Units voiced need of more pro-active inputs and feedback from industry in defining and continually updating technical specifications in line with evolution in products. Industry bodies for different manufacturing sub-sectors could play this role and provide interface between manufacturers and Indian Railways. Industry bodies could also help Indian Railways in dealing with non-performing suppliers or contractors.

Operations

Recommendation 5: Participate directly and digitally in procurement process. For most of procurement, Railways have completed digitisation of entire purchase process with increased transparency and accessibility. Industry players should participate directly i.e. without any intermediaries and using digital platform.

Recommendation 6: Ramp-up delivery capabilities for both manufacturing and project execution. Manufacturers could pro-actively increase local value-addition through developing next tier supplier eco-system. In order to encourage business initiation by domestic players, Railways' guidelines allow domestic players to bid even if they have one of the sub-components locally manufactured. Industry players can do more in many such cases to increase share of local value-addition. For many components, local value-addition is as low as 20 to 30 per cent. Component manufacturers should pro-actively develop domestic supply sources for sub-components which are currently imported.
Similarly, project contractors should look at ramping-up engineering staff, project management staff, labour sourcing to timely execute increasingly bigger and more complex Railways and Metro projects.

3C. Benefits to the nation

Railways and Metros can provide substantial business opportunities to industry and play a critical role in 'Make in India' and job creation. As per this study estimates, there will could be an incremental manufacturing opportunity of about Rs. 28,000 crore per annum (USD 4bn) for Indian Capital Goods players through implementation of these recommendations. This amounts to an EBITDA upside of Rs. 3,000-3,500 crore for the industry. Crucially, this will generate about 70,000 direct manufacturing jobs and a total additional close to 7 lakh total jobs including indirect and induced jobs.

Broader manufacturing sector of the country will also benefit from development of a deep component supplier ecosystem for Railways and Metros. Many of the capabilities needed for Railways manufacturing (such as precision manufacturing, system design and integration) could be leveraged across other manufacturing sectors as well.
On project execution side, successfully achieving targets on track construction, electrification, high speed rail, dedicated freight corridors will generate a total project execution opportunity of about Rs. 5 lac crore for industry over next 5-7 years. This will generate 60 to 70 lac man years of employment during the construction phase of these projects.

It is thus incumbent upon Railways and Metro corporations to further facilitate industry participation and upon industry to leverage these opportunities.

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January 2020
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