TATA CONSULTANCY SERVICES

Passenger Railway Industry: The Mobility Revolution Shows the Way Ahead

Executive Summary

The passenger railway industry has been under increasing pressure to transform due to changing business dynamics and customer expectations. There is a need for enhancing passenger experience and ensuring profitability for railway operators worldwide. The need is to invest in next generation rail travel where a passenger is informed at every stage of his journey in real time to enable personalized mobility. Mobility as a service (MaaS) is also gaining increasing traction today as the COVID-19 pandemic makes a strong case for contactless travel and minimized human touchpoints.

Emerging IoT based data sources will see greater uptake as they help travelers make better informed choices about their journeys. The use of IoT will also aid in better planning and optimization of transport networks and services. It will result in a resilient and connected rail travel experience that is safe, seamless and has the traveler at the front and center of the whole transportation business.

This paper identifies key drivers that facilitate a seamless travel experience with integration of multiple rail journey elements. It will enable rail operators to offer personalized mobility services while driving operational efficiency.

A paradigm shift from physical to digital connections

Today, the primary challenges plaguing the passenger rail industry includes lack of multi-modal journey planning or last mile coverage, customer safety, siloed travel platforms and non-availability of real time personalized and contextual information. The latter leads to long delays and queues at the stations for ticketing, commuting services and travel enquiries. Additionally, rail operators face issues with migration of legacy systems onto new payments systems. Overall, the absence of reliable connected infrastructure resonating between the passengers, and technology service providers, underpinned by obsolete business models is highlighting the need for change in railways.

Mobility as a Service (MaaS) is emerging as the key driver that facilitates the shift from physically connected to digitally connected services. Implementing a digital ticketing or a frictionless check out system that supports account-based, cashless and biometric ticketing in collaboration with other partners in the travel ecosystem could prove to be the starting point for better, safer customer experience. It will also reduce the cost of travel for rail operators and passengers alike. MaaS also facilitates reduction in environmental emissions, paving the way for cleaner travel.

Amidst and post the COVID-19 pandemic or any other future crisis of such nature, intelligent and contactless technologies would prove a key enabler of faster and safer rail travel. Already, health checks have become a norm in public travel and transportation. Going forward, digital factsheets/ general information about crisis scenarios will be an imperative need to guide railway staff on operations. The need is to have established protocols for:

- How to disinfect facilities and surfaces

- Training staff to handle passengers' concerns on safety measures

- Deploying health control checkpoints to minimize the risk of infected people

- Generating alerts and reminders for regular disinfection of entry/exit points, customer touch points, vehicles, and equipment

Moreover, systems imbibed with surveillance mechanisms, enable safety for travelers round the clock – in crisis and otherwise. These drivers could be supported by robust IoT ecosystem and prescriptive analytics within IoT, the two foundational technology themes driving the future of rail travel. For instance, imagine that a train gets cancelled while passengers are on their way to the station. The passengers receive a simple app notification informing them of the cancellation; while also providing a ready list of alternatives to choose from to quickly get to their destination. This would be an example of pure customer delight even in crisis. Passenger needs in future would go beyond predictions and this is where prescriptive analytics adds value. It not only determines or describes the travel challenges, but also prescribes solutions to overcome them using re-route mechanisms.

Intelligent rail travel: Focusing on passenger experience and safety

Travelers today are eager to choose their own way of seamless end-to-end travel; driven by one-stop solutions, making multimodal journey planning a key trend. The future of passenger rail travel will witness ecosystem play where multiple vendors will be part of the travel management system supported by aspects like customer engagement, planning and routing, booking and ticketing, reporting, partner management and payment gateways, all integrated on a single unified customer centric platform. Ecosystems inclusive of retailers, travel aggregators, caterers, smart technology providers, medical aid providers and other ancillary services (see Figure 1) will help create exponential value for travelers through industrial convergence. The benefits will come by way of reduction in delays caused due to long queues at ticketing windows, commuting services and travel enquiries; enabling frictionless automated payments and refunds, and ensuring seamless travel with real time updates for passengers. Coupled with prescriptive analytics to assist passengers across their journey; ecosystems will drive mass personalization, while simultaneously reducing the cost of operations and risks for rail operators.
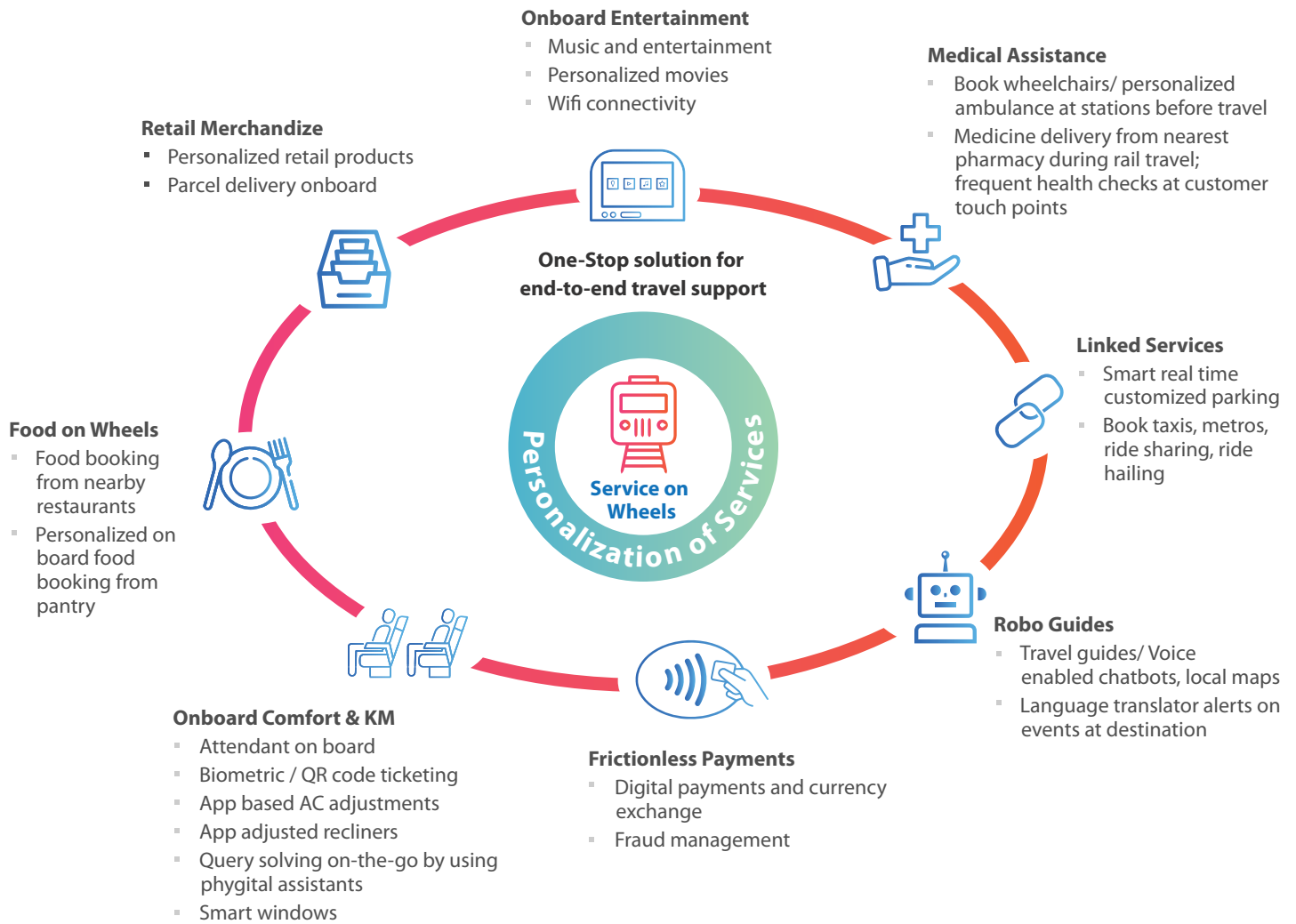
Onboard Entertainment
- Music and entertainment
- Personalized movies
- Wifi connectivity

Medical Assistance
- Book wheelchairs/ personalized ambulance at stations before travel
- Medicine delivery from nearest pharmacy during rail travel; frequent health checks at customer touch points

Retail Merchandize
- Personalized retail products
- Parcel delivery onboard

One-Stop solution for end-to-end travel support

Linked Services
- Smart real time customized parking
- Book taxis, metros, ride sharing, ride hailing

Food on Wheels
- Food booking from nearby restaurants
- Personalized on board food booking from pantry

Personalization of Services

Service on Wheels

Robo Guides
- Travel guides/ Voice enabled chatbots, local maps
- Language translator alerts on events at destination

Onboard Comfort & KM
- Attendant on board
- Biometric / QR code ticketing
- App based AC adjustments
- App adjusted recliners
- Query solving on-the-go by using phygital assistants
- Smart windows

Frictionless Payments
- Digital payments and currency exchange
- Fraud management

Figure 1: Personalization of Services

Passenger safety - the engine for seamless travel experience

Some of the key customer safety trends that are currently in high demand in the passenger railways segment include deriving real-time information on rail movements and leveraging predictive maintenance and driver assistance systems. As part of predictive maintenance strategies, some of the leading rail operators use artificial intelligence (AI) to identify defects in their locomotives and cars thereby preventing any untoward incidents. AI helps in predicting when assets need maintenance with real-time asset health monitoring sensors. The advanced driver assistance systems help in preventing accidents and prescribes solutions to avoid any mishaps in real time.

Cyber security is also becoming a priority for rail operators as the cyber threat landscape expands; putting passenger data privacy at risk. Physical safety, an erstwhile challenge for rail transport, is also witnessing increasing emphasis with rail operators leveraging systems with high-tech

3D cameras, biometrics and sensors to track the behavior of passengers moving through subway stations and eventually report any suspicious activities. Biometric ticketing inspection would help in identifying passengers thereby reducing frauds. Machine vision based automatic inspections, leveraging high resolution video cameras and drone-based surveillance at the stations and depots is becoming a surging trend now, enabling safety of people and railway assets.

The road ahead: Learn, leap and lead

A need that has emerged from the pandemic is for increased passenger safety. Digital technologies will play a key role in helping rail operators ensure better communication, crowd control, as well as operational logistics. The combination of IoT, AI, predictive and prescriptive analytics, and other technologies will pave the way for connected rail wherein MaaS will help interlink various modes of transport. Leveraging a connected ecosystem will help railway companies deliver mass personalization, thereby providing best-in-class travel experience to the customers; driven by better safety and simplified processes. This in turn will help the passenger railway companies to track their customers' preferences and analyze the patterns of travel.

The future of passenger rail travel will be providing enhanced customer services and convenience. This will be enabled by an intelligent end-to-end transport system, capable of optimizing resources, learning from pitfalls, re-routing the journey, and leading the way with predictive mechanisms. Rail operators need to get on board.

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