India

Data Collection Survey for Enhancing Non Rail Revenue and Social Impacts of the Indian Metro Projects

Final Report

Executive Summary

February 2022

Japan International Cooperation Agency (JICA)

McKinsey & Company Inc. Japan

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Executive Summary

1. Objective and overview of the project

We performed a study of possible new businesses for the Delhi Metro Rail Corporation (DMRC) for the purpose of increasing non-fare revenues – particularly in areas related to a digital technology platform.

The development of new businesses through digital platforms has become particularly common in recent years, making it possible to quickly develop detailed services that meet customer needs without requiring large investment decisions. And the spread of mobile devices such as smartphones has made reaching customers easy, creating demand for digital services where a certain amount of data is provided to receive an optimized (personalized) service.

In this project, we confirmed what kinds of businesses might make it possible to increase non-fare revenues, whether they could be realized via a digital platform, and what the feasibility of the required partnerships would be among other things.

A joint team of DMRC, JICA HQ, JICA India office and McKinsey India and Japan offices had been established to run the data collection survey. At the DMRC MD's instruction, the Delhi Metro established a team under the leadership of the ED of Operations who was assisted by GM of Telecommunication, GM of IT, GM of Property Business and GM of Finance. The McKinsey team was headed by team leaders from Japan and India and was assisted by a project manager. The McKinsey team worked closely with JICA HQ and JICA's India Office in analyzing case examples from other countries and businesses, performing customer journey analysis, and holding idea generation workshops.

The project has been conducted in 3 phases:

(1) **Blueprint phase:** This phase lasted 3 months and involved global benchmarking of best-in-class apps, journey analysis of a metro customer, ideation of new digital use cases for DMRC, based on which, a business plan was created.

(2) **Build/pilot phase:** This phase of the project involved building the minimum viable product (MVP) version of the digital platform, including reaching out to potential partners and incorporating prioritized digital use cases onto the app.

(3) **CUG testing:** The last month of the project was spent to get user feedback on the MVP, while finalizing the draft final report and final report

2. Learnings from global cases

Before we begin the detailed assessment of digital platform business for DMRC, we collected case examples from other countries of the use of digital platforms in railways, as well as smart cities and other socioeconomic infrastructure businesses. They included the following three archetypes: 1) smart payments using prepaid cards or app-based payments, as well as the peripheral ecosystem, 2) the MaaS (Mobility as a Service) area, covering end-to-end mobility, and 3) things that are broadly related to the lifestyle area, including ecommerce, lifestyle, media, etc. Figure 1 below presents 10 global use cases.

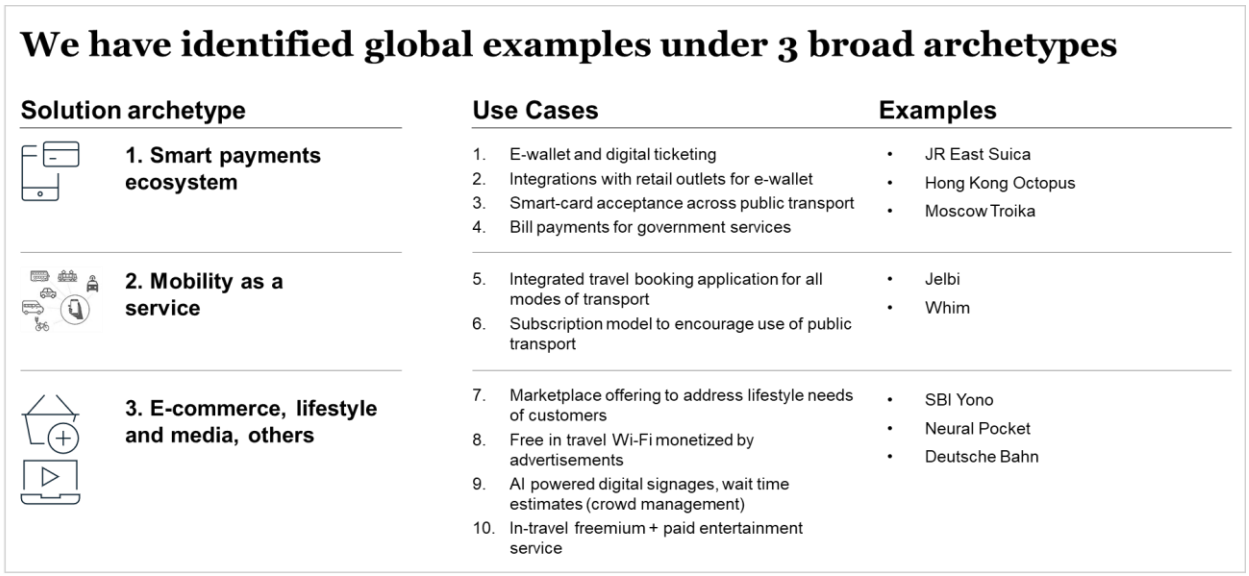


Figure 1 – Three archetypes in advanced global examples

3. Passenger journey analysis and idea prioritization

Based upon these advanced case studies, we used customer journey analysis on Delhi Metro users to identify pain points (customer issues and areas of dissatisfaction) and create rough ideas for new business to address them.

Specifically, at a workshop (hackathon) with DMRC members, we performed everything from preliminary journey analysis to idea generation, then held focus group discussions (FGDs) with 42 people divided into 6 categories by gender and reason for travel and conducted an online survey targeting 1,000 Delhi Metro users to check sensitivity toward those ideas both qualitatively and quantitatively. Because adopting an approach that emphasizes an understanding of the customer was an important element for this study, we summarized personas for four representative profiles – working professionals, students, home makers and tourists.

Most of the pain points we heard were shared between groups, with many people complaining about the inconvenience of having to wait in long lines to purchase tickets or go through security check at the entrance of the stations. In addition, many mentioned experiencing stress about wait times, and about being able to quickly get information about when they would be arriving at their destination station, or which direction to go in the station when changing trains or getting off the train, etc. There were increasing expectations for the introduction of digital technology to increase convenience (e-tickets, wait time indicators, an app for notifying when you are approaching the desired station, station guides, etc.). We also discussed ideas that were more related to e-commerce or entertainment as ways to more conveniently use the time spent on the train or after arriving at the station.

Although we did determine that most needs were broadly shared, there were some items for which the amount of emphasis differed between groups. For example, with regard to security, multiple female groups

said that it was a key item that needed improving, not only on the train, but including access from the arrival station to the destination.

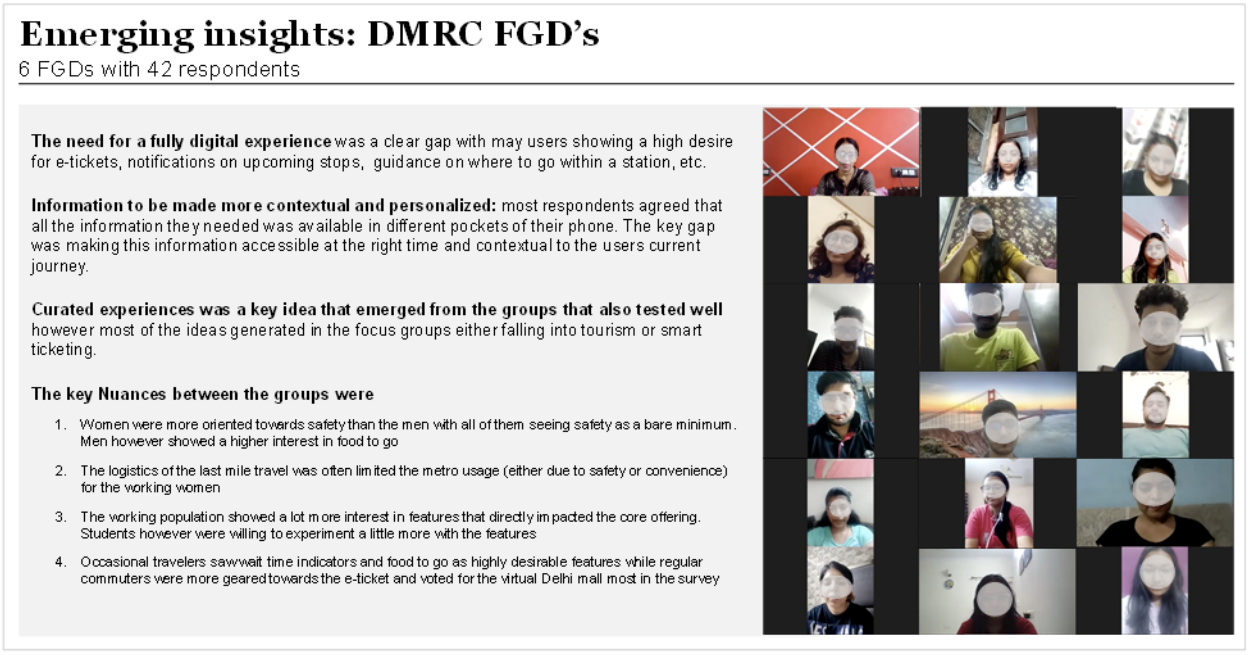


Figure 2 – Insights from Focus Group Discussions

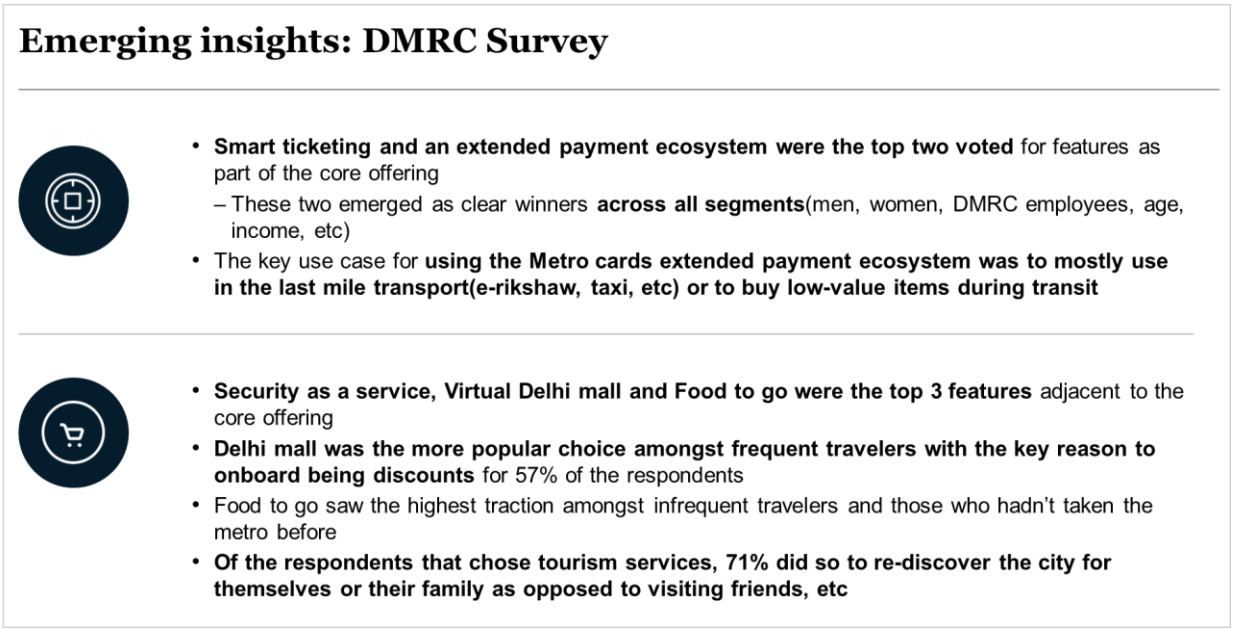


Figure 3 – Insights from DMRC survey

As a result, we identified 14 ideas including the ones that have already been implemented by overseas railways or smart cities business, as well as ones that were supported by our hackathon, FGDs and surveys, but have not been implemented anywhere else in the world in context of public transit. They were scored based on three elements – impact (in terms of the contribution to user experience or revenues), feasibility, and confidence – and nine ideas were prioritized. The prioritized ideas included Smart offers, Virtual Delhi

Mall, Travel and Tourism Hub, Integrated Mobility, Extended payments ecosystem, Security as a Service, Next-gen ticketing system, Real-time wait indicator and Food to go.

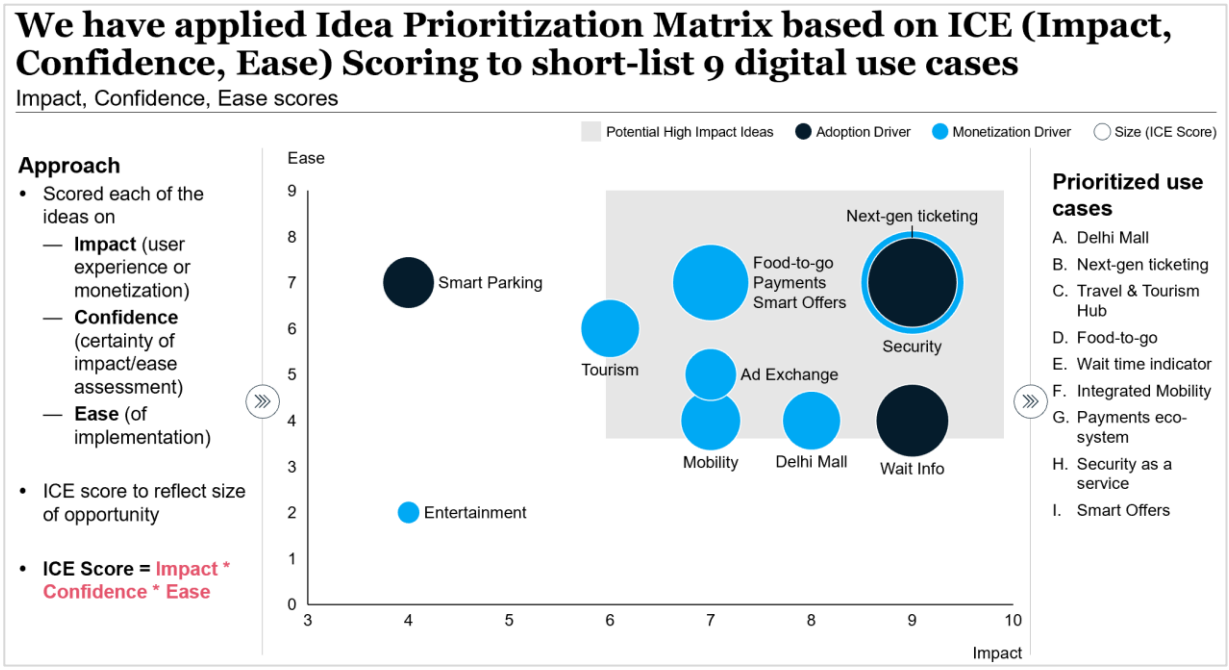


Figure 4 – Shortlisting of use cases

Because no use-cases with exceptionally large impact were found after performing a comprehensive investigation of prioritization and impact, and because the survey of customer trends indicated that both use-cases that guided users to the app (i.e., that encouraged its spread) and use-cases that would actually lead to revenues would be required, it was concluded that a platform should be built that pursued a relatively broad range of ideas simultaneously.

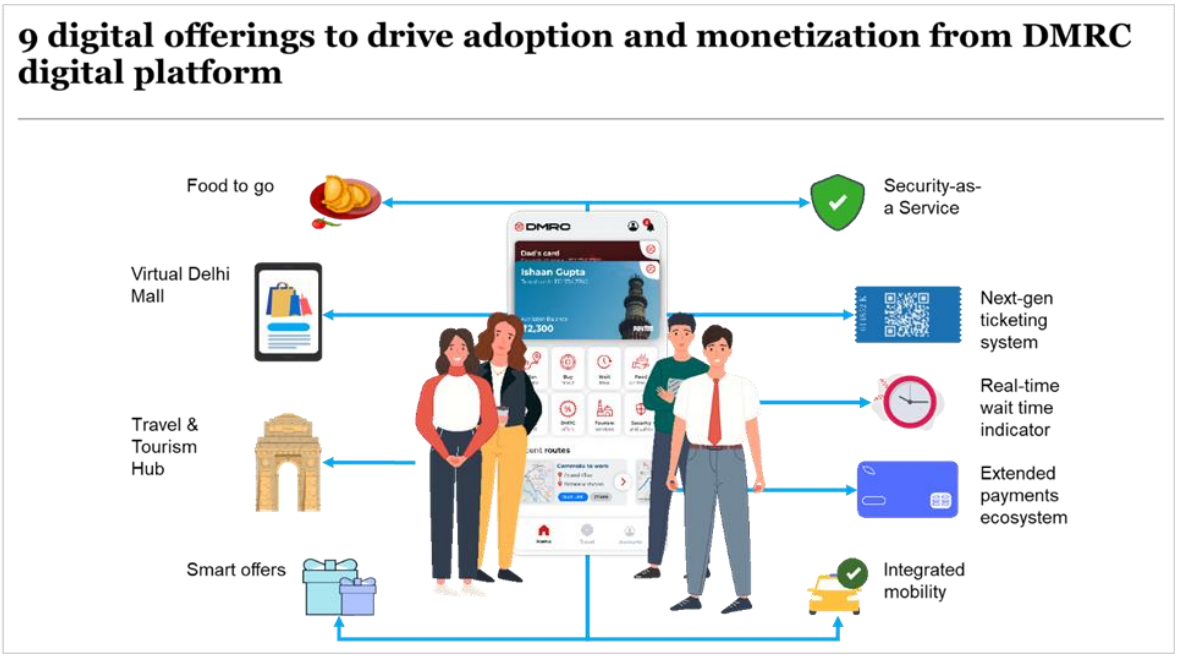


Figure 5 – Digital offerings to drive adoption and monetization

In conclusion, we have conducted an assessment of business viability risk assessment for nine use cases, and determined to implement four services on MVP for the pilot phase in this study: (1) Smart offers, (2) Tourism Hub, (3) Virtual Mall (Shopping) and (4) Mobility features – transit support, cooperation with feeder services like taxi, and smart card recharges. Figure 6 shows the prioritization process from hackathon to pilot.

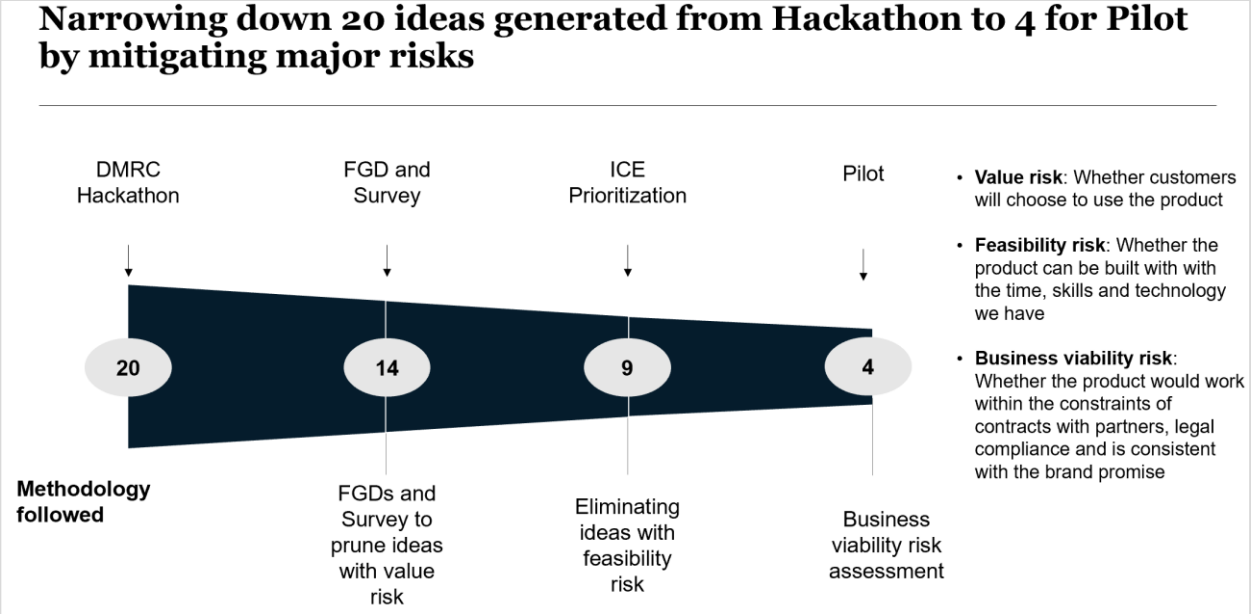


Figure 6 – Pilot usecases (ideas) selection

4. Business case

While this project has a certain guaranteed customer base in the form of the DMRC ridership, the aim is to expand the provision of products and services by partner companies, creating an ecosystem that will in turn stimulate further demand. This ecosystem not only has the potential to increase revenue from giving users access to multiple products and services, but also, through network effects and ease of use, increase the number of DMRC commuters themselves. The vast amount of data that will be generated through a complete digital user journey can also allow for customizing products and services being offered to the customers, thus enhancing the user experience. Figure 7 describes value proposition of the DMRC digital platform.

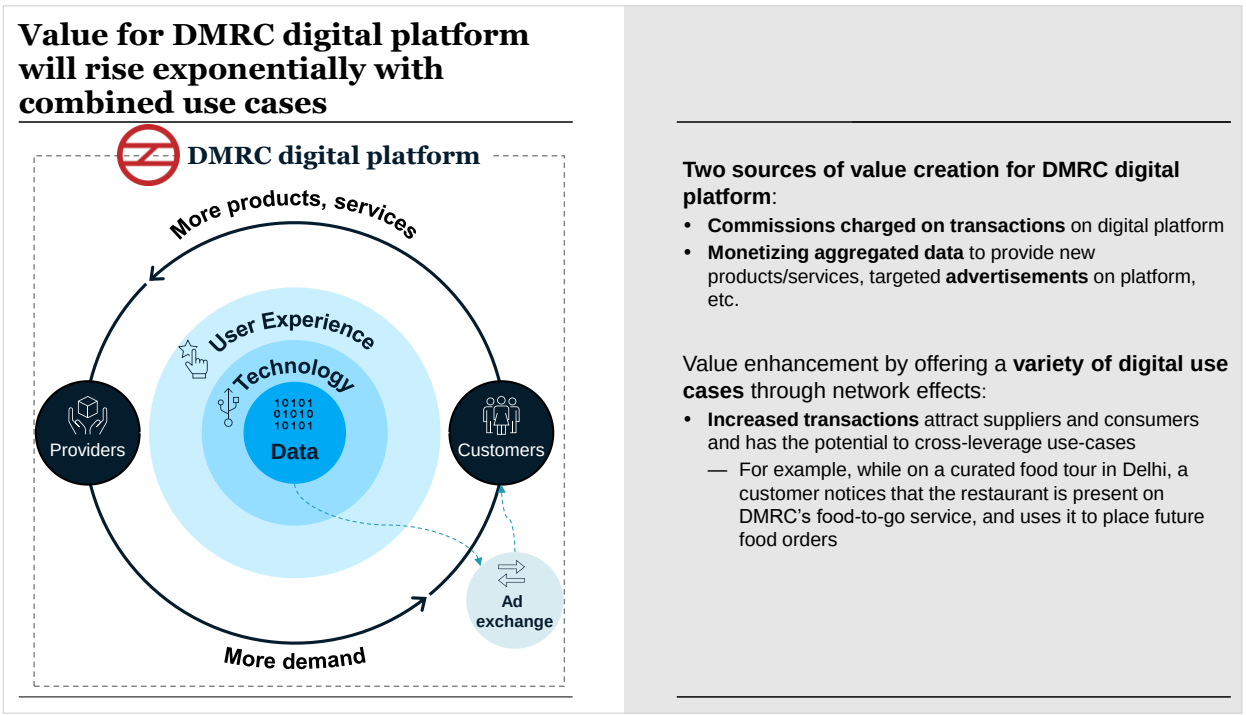
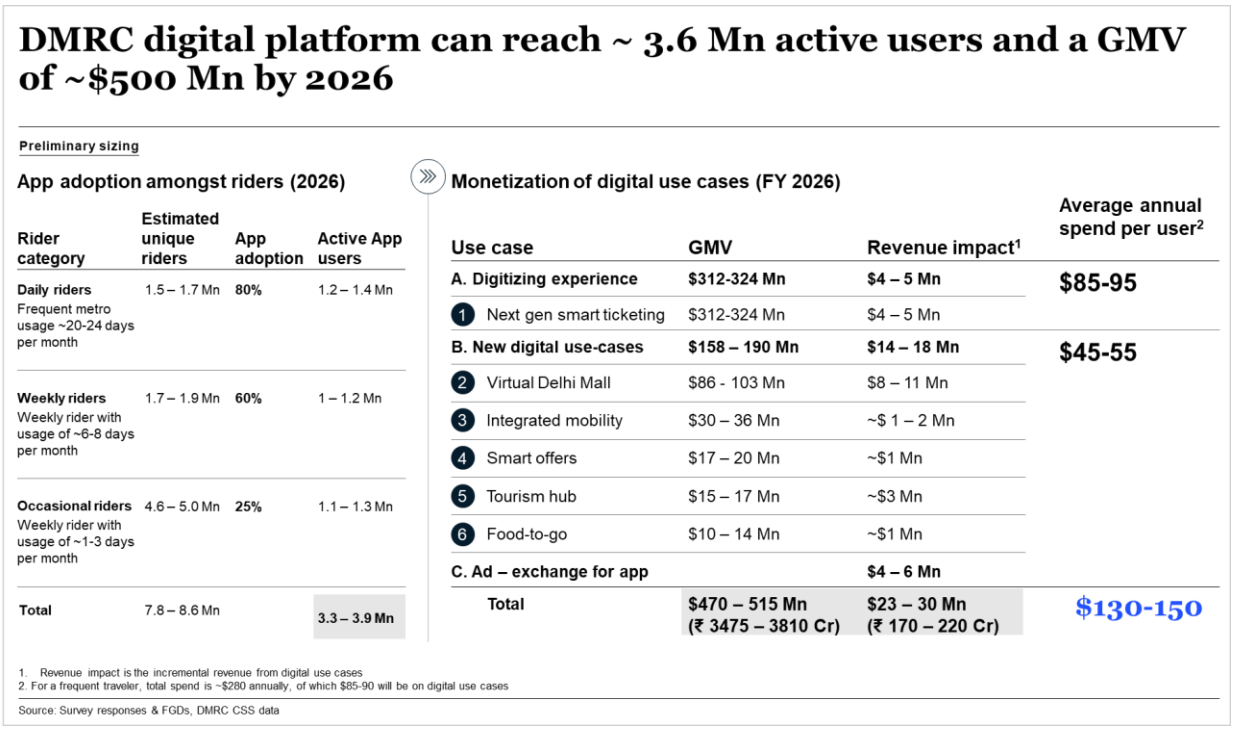


Figure 7 – Value proposition for DMRC digital platform

The economic value (revenue model) for the DMRC can be roughly categorized into 1) commissions charged for various transactions performed on the digital platform (this assumes that the services themselves will be provided by the partner companies), 2) the monetization of data such as feedback about products and services, reactions to advertisements, 3) farebox revenue growth by increasing Delhi Metro users caused by powerful engagement with those who will use the digital platform, etc.

For each use-case, we estimated sales (service spending) and revenues for the DMRC. For the estimation, the customer segments were roughly divided by railway usage frequency, and then multiplied by the service penetration rate to arrive at the total user base, which was then multiplied by average spend to estimate market size. This was then multiplied by the estimated acquired share (although because customer response cannot be fully confirmed before development, this is really more of an aspirational value) to arrive at the estimated GMV.

Based on this, we calculated the potential monetary impact of each use case to arrive at a business plan for the new platform. We estimated that by 2026, the app will have 3.6 million active users, and lead to a Gross Merchandise Value (GMV) transaction of $500 Million annually, leading to a revenue of $23–30 million for DMRC. The non farebox revenue will build up over time as the users adopt the app, and the purchasing behavior change over time with frequent usage of the app. By 2026, share of use cases except for smart ticketing is expected to reach 36% of overall spend on the platform on GMV basis, leading to 81% of total revenues for Delhi Metro. Overall, we estimate the valuation of the platform to reach $1–1.3 billion by FY 26. The detailed calculations are shown in Figure 8 below.



DMRC digital platform can reach ~ 3.6 Mn active users and a GMV of ~$500 Mn by 2026

Preliminary sizing

App adoption amongst riders (2026)

Rider category	Estimated unique riders	App adoption	Active App users
Daily riders Frequent metro usage ~20-24 days per month	1.5 – 1.7 Mn	**80%**	1.2 – 1.4 Mn
Weekly riders Weekly rider with usage of ~6-8 days per month	1.7 – 1.9 Mn	**60%**	1 – 1.2 Mn
Occasional riders Weekly rider with usage of ~1-3 days per month	4.6 – 5.0 Mn	**25%**	1.1 – 1.3 Mn
Total	7.8 – 8.6 Mn		**3.3 – 3.9 Mn**

Monetization of digital use cases (FY 2026)

Use case	GMV	Revenue impact[1]	Average annual spend per user[2]
A. Digitizing experience	**$312-324 Mn**	**$4 – 5 Mn**	**$85-95**
1 Next gen smart ticketing	$312-324 Mn	$4 – 5 Mn	
B. New digital use-cases	**$158 – 190 Mn**	**$14 – 18 Mn**	**$45-55**
2 Virtual Delhi Mall	$86 - 103 Mn	$8 – 11 Mn	
3 Integrated mobility	$30 – 36 Mn	~$ 1 – 2 Mn	
4 Smart offers	$17 – 20 Mn	~$1 Mn	
5 Tourism hub	$15 – 17 Mn	~$3 Mn	
6 Food-to-go	$10 – 14 Mn	~$1 Mn	
C. Ad – exchange for app		**$4 – 6 Mn**	
Total	**$470 – 515 Mn (₹ 3475 – 3810 Cr)**	**$23 – 30 Mn (₹ 170 – 220 Cr)**	**$130-150**

1. Revenue impact is the incremental revenue from digital use cases
2. For a frequent traveler, total spend is ~$280 annually, of which $85-90 will be on digital use cases

Source: Survey responses & FGDs, DMRC CSS data

Figure 8 – Potential for DMRC's digital platform

5. MVP Pilot

To test the feasibility of the new business concept, and the customer reaction to the DMRC digital platform, we launched a mobile app that incorporates four use cases as a Minimum Viable Product (MVP). The build of the pilot was to be taken up in an agile manner accomplishing specific goals at six periodic intervals between August 2021 to December 2021. We validated the use-case suitability, user interface appropriateness, and interests from potential partner companies. As summarized in Figure 9, out of the five KPIs we set to measure the success of the digital platform, customer satisfaction, percentage of repeat transacting users, and number of partners onboarded has been achieved at the time of the writing of this report on February 2022. The remaining two KPIs – percentage of transacting users out of registered users and percentage of non-transacting users out of registered users with >3 average page visits per session, could not be achieved due to the outbreak of third wave of COVID-19 in Delhi during the months of December 2021 to February 2022. Metro travel was restricted and not many people used the metro during the period thus impacting the usability.

Recap of KPIs to measure success of the implementation

Area of focus	Sub Area	KPI	Aspiration	Metric
User Experience	Usability	Customer Satisfaction Rating	> 3/5	4.54
		Percentage of transacting users out of registered users	> 25 %	13 %
		Percentage of repeat transacting users out of transacting users	> 10 %	33 %
	Engagement	Percentage of non-transacting users out of registered users with >3 average page visits per session	> 40 %	33 %
Partners	Onboarding	Total number of partners onboarded	>= 6	13

Figure 9 – KPIs measuring implementation success

(1) User testing and feedback

Once the MVP was developed, we have conducted a two-phased user testing. First, we carried out a user testing with 10 users between 13th December 2021 and 15th December 2021, where we asked 10 potential users identified through research agency to use the app and provide feedback. After incorporating their feedback, we launched the MVP app as a beta version on 17th January to an additional 100 friendly users identified through research agency and conducted a closed user testing as well as a quantitative survey and qualitative feedback interviews.

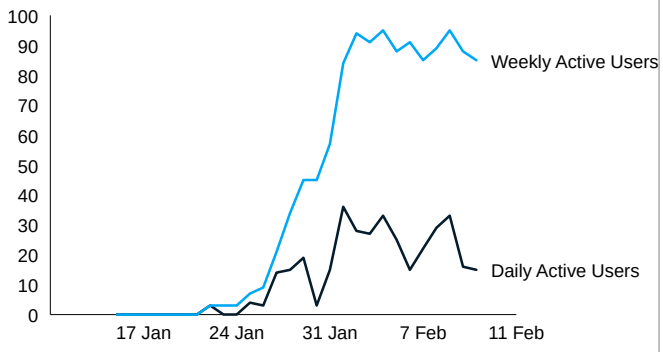
Initial testing was carried out prior to the MVP app launch where we set tasks for 10 users to complete through the app and observed them closely to identify 14 improvements. User response was positive with an overall rating of 3.5 out of 5 for the app. After app launch, we were monitoring usage closely. As seen in Figure 61, the app has seen high user engagement with ~90 weekly active users averaging 16 mins per session. The virtual mall and the tourism hub pages accumulated ~3400 page vies, while Portronics and Sarojini Market Online had maximum unique user visits on the app.

Of the 100 users, 77 users responded with an average satisfaction rating of 4.54 out of 5, far exceeding our expectations. Users were highly satisfied with the app's easy to use and clear user interface as well as the breadth of use cases supported. Reinforcing our finding during usability testing, users also see a potential for this app to eventually become a super app with multiple services tied together into one app. This validates our broader vision for the app and is in line with our ambitions for the eventual scale up.

To test the Product-Market fit, we employed Sean Nellis test. In the case of our app around 45% of users claimed to be either disappointed or somewhat disappointed if they can't use this product anymore. This is a great sign for a Pilot product.

We have seen high user engagement for the app

Sustained user engagement for the MVP



Key Metrics	MVP result
Weekly active users	~90
Average time per session	16 mins
Average sessions per day per user	1.25
Smart card page views	86
Smart card balance check page view	546
Route planning page viewed	~1000
Virtual mall/tourism hub page view	~3400

Virtual Mall unique user visits

Partner	Unique user visits
Bombay Shaving Company Women	15
Sarojini Market Online	33
Portronics	39
Janpath Online	27
Bombay Shaving Company	21

Figure 10 – User engagement for the MVP

(2) Partner company value proposition

As part of the Virtual Delhi Mall, Tourism Hub and Smart Offers use cases, we reached out to multiple partners to explore possibility of working together for the pilot phase, and ease of integration. Of the 60+ partners we reached out, 26 companies expressed their interests, including aggregators, and we integrated them fully to the app. Participating partner companies expressed eagerness to improve their offers and update them regularly to continue to attract more customers. At the same time, they have expressed desire to engage DMRC on further scale up, including the discussion on commercial arrangements and simplification of the Letter of Intent process.

Given the fact that the MVP phase was just limited to 100 users, and the partners did not have a working product to assess the full functionality of the DMRC app, this was a promising result. It shows that DMRC can be successful in forging multiple partnerships during the full scale up phase. With multiple partners, the discussions were still ongoing at the time of launch of the MVP, and it is quite possible that they are integrated during the MVP duration, based on results of the MVP itself. This shows a potential that DMRC platform can act as an end-to-end mobility platform for all Delhi commuters, not just the ones using metro.

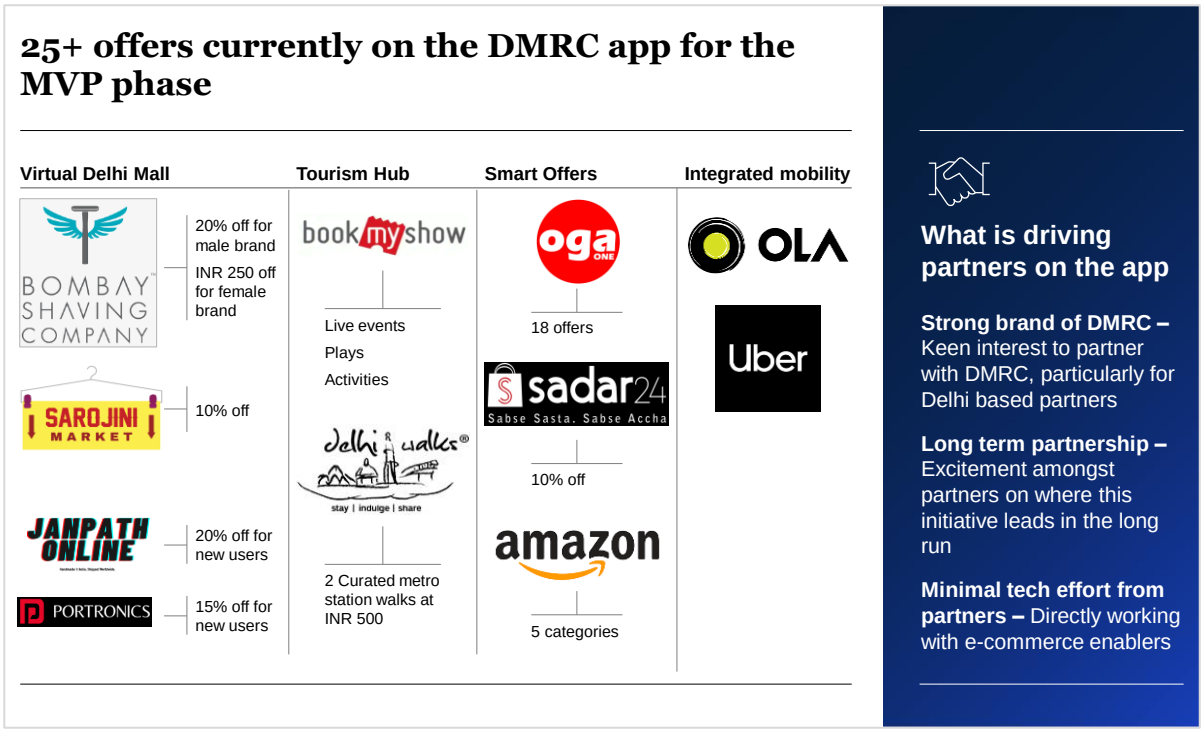


Figure 11 – Partners and aggregators integrated on the platform

(3) Recommandations

Based on user inputs and feedback we suggest the following for the roadmap ahead:

- Onboard more payment partners for convenient in-app recharge to enable seamless recharge for smart cards
- Include information on food stalls and businesses within or near metro stations for user's convenience
- Build notification engine with smart nudges to sustain high app usage to serve context sensitive notifications on
    - New incoming offers from partners and aggregators
    - Potential metro service disruptions along user's frequent routes
    - Reminder to recharge smart card balance by certain date based on usage history
- Integration with more last mile transport players for integrated mobility such as Bus, Bikes, or other low-cost means
- Adding more features to support users' lives with holistic way - users are unconsciously looking for a super app that allows user to search less and think less
    - Ability to pay utilities bills and buy essential products/services
    - More Delhi specific features such as increased coverage of ticket booking for monuments and local attractions
- Partnerships with deeper integrations to enable automated lead tracking and establishing criteria for partners to enable smooth user experience on platform.

Figure 12 – Post MVP launch recommendationsFigure 12 depicts the key recommendations across the use cases. Adding more partners and better offers was one of the key recommendations along with increased products and services across shopping, travel and integrated mobility. There were also recommendations on adding bill payments and smart card recharges while also making the recharge and balance check real-time.

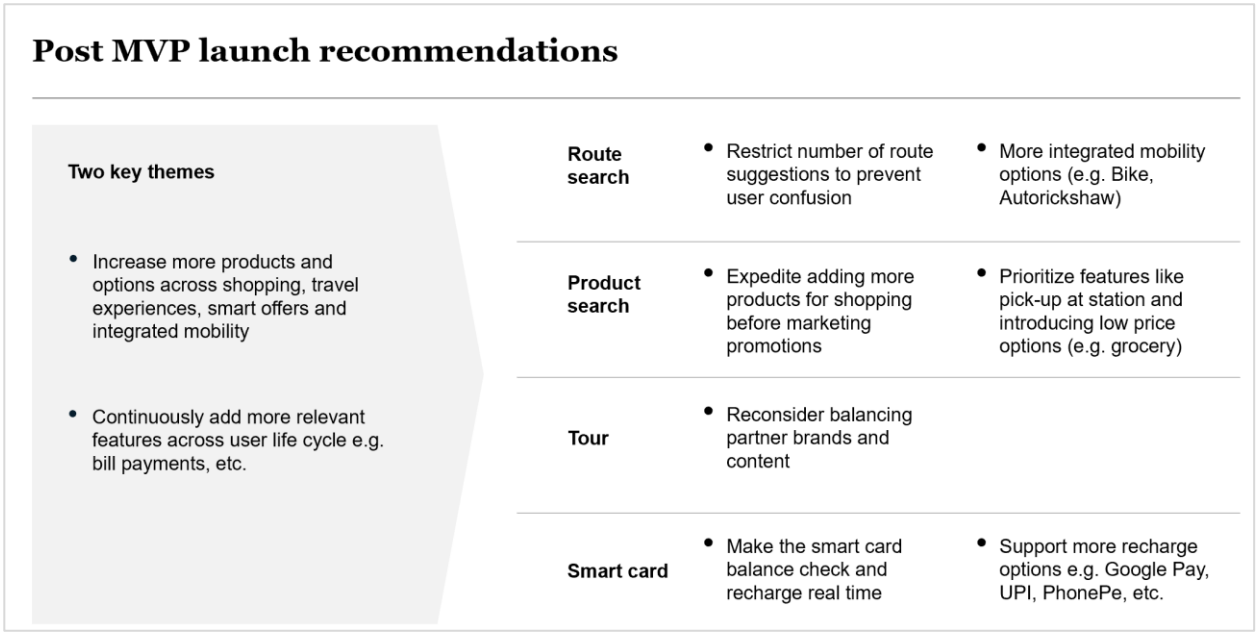


Figure 12 – Post MVP launch recommendations

6. Future scale up of the digital platform

Post the MVP phase in this study, the DMRC team needs to scale up the product to realize the potential from building the digital business. The overall implementation roadmap for DMRC digital platform is given below in Figure 13, which captures the implementation roadmap across the MVP stage, platform launch and ramp-up and rapid scale up of the digital platform. By 2026, the app is expected to host ~3.6 Mn active users and achieve GMV of ~ $500 Mn and the revenue impact of ~ $30 Mn. Referring to the annual revenue of DMRC in 2022 is $800Mn, the possible digital platform market would be impactful from a financial perspective.

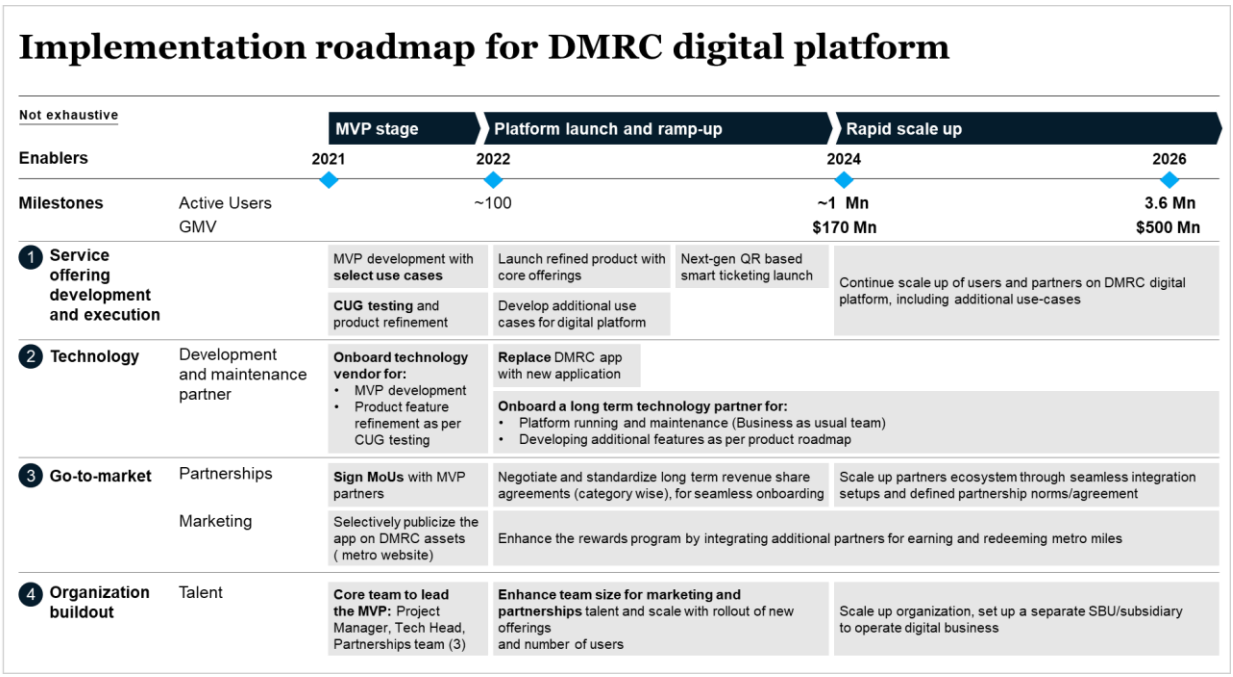


Figure 13 – Implementation roadmap

For a seamless transition from MVP build to the full scale up of the digital platform, DMRC needs to consider the following factors of business build: Organization, budget, and infrastructure upgrade. On organization, it would be important to set up a dedicated unit that has strong ownership of the digital platform and appropriate capabilities (Figure 14). For budget, as shown in Figure 15 エラー! 参照元が見つかりません。, $3-5 million will be needed to launch the platform in the next 2 years, and there will be a need for $10 million or more in the following years during scale up, including the marketing cost (as described above, the platform will turn to profit-positive by 2026).

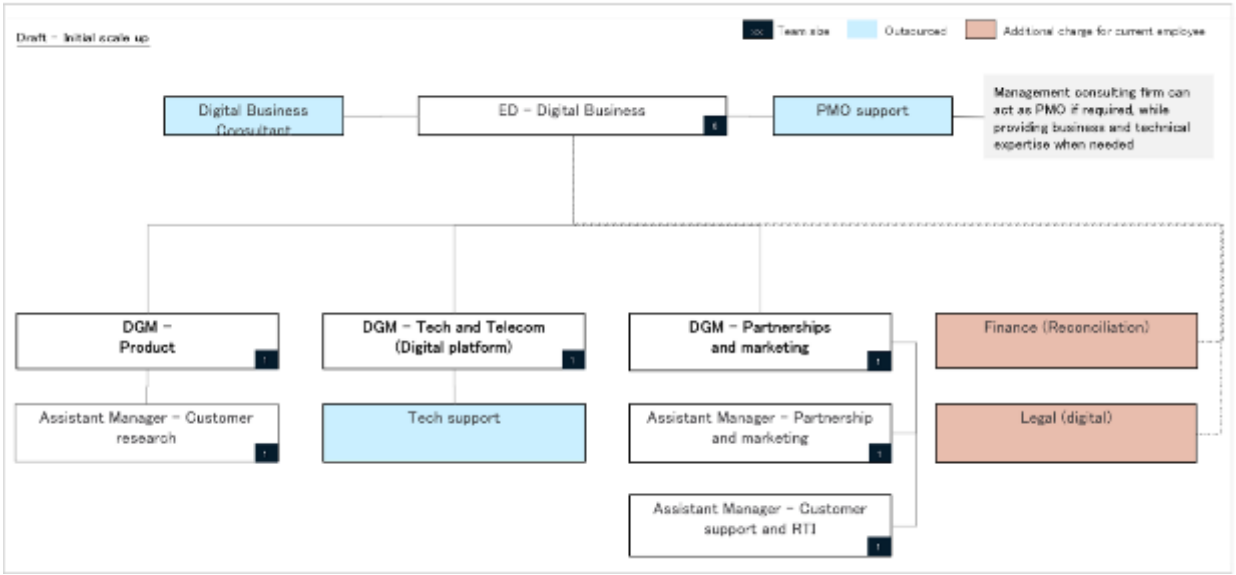


Figure 14 – Organization structure required for scale up

Cost heads	FY23	FY 24	FY 25
Tech infra cost	2	6	14
IT development & maintenance costs (outsourced)	6	11	15
Marketing costs	2	9	33
Staff costs (other than tech)	4	5	6
Other miscellaneous	1	2	3
PMO support	10	0	0
Total	**20–25**	**30–35**	**70–75**
Total (JPY)	**~ 310–380 Million**	**~ 460–540 Million**	**~ 1.1–1.15 Billion**

Figure 15 – Budget required for next three years

While we focused our efforts in this survey to build the new digital business platform, impact of this initiative goes beyond immediate revenues and profits DMRC can generate. As seen in Figure 16, there are four levels of impact, and we believe impact creation in these four different levels can create additional potential for DMRC to take advantage of this digital platform as a way to leverage further economic and social impact.

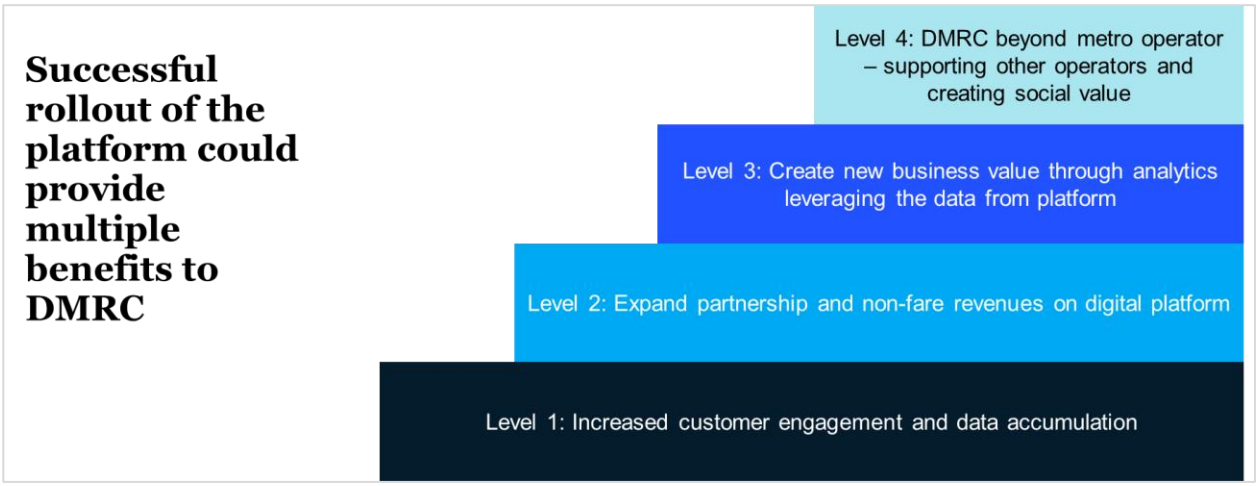


Figure 16 – Four levels of benefits to DMRC

- Level 1: The digital platform building centered by the mobile app could lead to increased engagement and touch points with 1.5 million Delhi Metro passengers, who uses the app on average 1-1.5 hours / day on the train or in other places. This means not only people movement data but also could include purchase data and behavioral data to be accumulated by DMRC.
- Level 2: DMRC can enhance non-fare revenue through cooperating with partners providing goods and services on digital platform. Moreover, providing those attractive services on the platform is expected to increase DMRC riders (i.e., fare box revenue increase).

- Level 3: DMRC can consider new businesses and measures (e.g., dynamic pricing on metro riders, personalized ads, improved marketing ROI, etc.) by applying data analytics leveraging data accumulated from levels 1 and 2 and hence further improve its revenue generation capacity.
- Level 4: DMRC can further enhance its economic impact by providing Software-as-a-Service (SaaS) and advisory support to other metro operators and generate revenue. In addition, it is also expected to serve as social impact by fostering women's empowerment, decarbonization, development along the railway lines, and regional development and so forth, through which DMRC's corporate value will be enhanced.

We have also run preliminary estimate on the impact of GMV and DMRC revenue through the four levels of activities mentioned above (Figure 17). While there are many assumptions, we believe that the four levels of activities will contribute to an increase of DMRC revenue from 154 billion JPY today to 172 billion JPY in 2029, a 12% increase in the revenue which also leads to the same level of improvement on their EBITDA. The investment it takes and revenue uplift we could expect from such digital business platform is very different in nature than the large scale capex project (e.g., extension lines) – the digital business platform could be much more nimble and limited in upfront investments required. This is the benefit of diversifying DMRC's revenue sources.

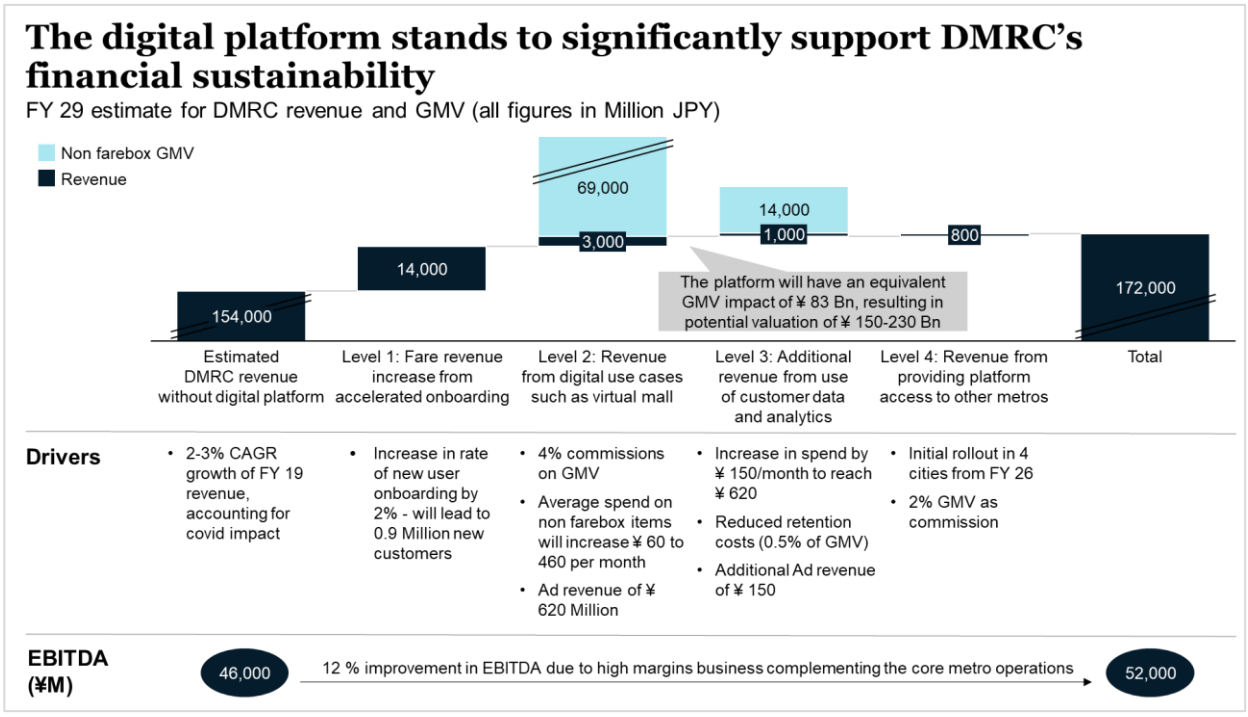


Figure 17 – Supporting DMRC's financial sustainability

7. Conclusion

In this project, we explored the potential of digital platform business for non-fare box revenue increase in close collaboration with DMRC. The MVP app we developed based on the feedback from Delhi Metro users received higher-than-expected user satisfaction and interests from partner companies, indicating exciting potential for the future. Moreover, we explored possibilities of using DMRC's data and digital

application beyond the digital platform app, so that further customer engagement can lead to increased fare-box revenue, or opportunities for use of advanced analytics and service provision for other metro operators.

At the same time, new business building of such a digital platform, and eventual profit generation over the several years, is not an easy task – it requires appropriate dedicated organization, secure budget, and infrastructure to support the project. To support such activities at DMRC, JICA may consider extension / expansion of existing yen-loan arrangements and future technical cooperation projects.

Digital platform is different from traditional large-scale infrastructure projects in terms of the nature, timeline, investments, skills and mindsets required. We hope the learnings from this project will be fully utilized for future activities.