INTRODUCTION

India has the highest mobile data consumption in the world with approximately 1.18 billion mobile connections. This huge market has given immense importance to app development in the country. These apps have a wide variety of uses ranging from entertainment such as gaming and online shows to work which includes email and other tools. Other important benefits provided by apps are faster and easier communication, online education, etc. These apps have helped Indians significantly in multiple ways. Many apps proved a boon during the coronavirus pandemic. E.g., the Aarogya Setu app helped to track and trace infections, and alert other individuals to take precautions. Other apps helped people connect with their friends and relatives, spend leisure time, allow remote work, and helped businesses run their operations smoothly. A study by ICRIER and Broadband India Forum found that internet contributed 5.6% to GDP in 2015-16. This figure increased to 16% of GDP in 2020, out of which 8% was contributed by apps. Another study by the World Bank found that every 10% rise in broadband penetration, leads to higher GDP growth by 1.38% in developing countries. These studies highlight the importance of internet penetration and apps in India.
Fuelled by the large and growing demand, India’s app development industry is expected to grow rapidly. According to Statista, India’s app market revenue is expected to reach US$ 1,662.4 million in 2022 and increase at a compounded annual growth rate (CAGR) of 9.2% to reach US$ 2,364.6 million in 2026. The Progressive Policy Institute (PPI) expects India to overtake the US as the country with the largest developer population by 2024. The growth of low-code / no-code app development, which requires low to no knowledge and application of coding languages, is further expected to boost growth in this market.

**Co-WIN AND AAROGYA SETU LAUNCH**

During the pandemic, the government enacted several measures to combat the spread of the virus and get everyone vaccinated. These measures included the launch of two popular and crucial apps known as Co-WIN and Aarogya Setu. This sub-section provides some highlights on the role played by these two apps.

**Aarogya Setu**

Aarogya Setu is an app developed by the Indian government to help in the fight against covid-19. The app aims to connect essential health services with the people. The app helps in tracking infections, contact tracing, alerting people about nearby infections and also informs users regarding the risks, best practices and advisories related to the containment of the virus. Contact tracing is carried out by tracking users through GPS coordinates and Bluetooth. If a person in the vicinity of the user contracts covid-19, the app alerts the user and helps to assess the risk of infection. To improve accessibility, the app
supports over 12 languages. Aarogya Setu has more than 10 crore downloads on Google Play Store.

The app played a vital role during the pandemic to contain the spread of the virus. The government encouraged people to download and use the app. It was also made mandatory for some public and private sector employees. According to data received by India Today, the app traced 8.4 million cases in 322 days. On average, it traced 26,200 cases each day. Interestingly, no cost was incurred in the development of this app as the work was done by volunteers on a pro bono basis. No cost was incurred on advertising as well.

**Co-WIN Vaccinator App**

The Co-WIN platform was launched by the Government of India to help with its huge vaccination programme. The Co-WIN app was launched along with the platform. The Co-WIN platform enabled users to register themselves for covid-19 vaccination as well as check the availability of vaccines, issue and verification of vaccination certificates and so on. The app registered a user with their Aadhaar number which prevented duplication of registrations and tracked the vaccination status of citizens. This also provided the government with ready data of the success of the vaccination campaign. As of February 23, more than 175 crore doses had been given and over 75 crore Indians were fully vaccinated. The Co-WIN Vaccinator App has more than 1 crore downloads on Google Play Store.

Many countries, especially in Africa, have struggled to digitise their vaccination records. This coupled with lack of proper communication, lack of doses, vaccine hesitancy, etc. mean that such countries have low vaccination rates. Germany, too, struggled with digitisation for a short period when it shifted from paper vaccination passports to digital ones, as pharmacies had to digitise the passports. The pharmacies struggled to do so due to server issues and other problems, due to which many people were unable to get the digital vaccination passport needed to travel to other EU countries. Digitising vaccination records enabled the Indian government to easily record the vaccination data. It also made it easier for Indians to carry their proof of vaccination in their pockets.

**CURRENT SCENARIO / TRENDS**

India’s app development industry is growing rapidly. New trends are making progress and becoming commonplace rapidly. Having a fancy website may not be enough if the website is ill-suited for accessing through mobile. Especially when most people are accessing the internet through mobile, having an app is recommended. Similarly, chatbots which were rare in the past, can be seen on many websites today.

Given below are some of the popular trends seen in recent years:

- **Artificial Intelligence:** Artificial Intelligence (AI) is fast gaining popularity due to its wide variety of applications. AI technologies are being used in several sectors such as automobile, healthcare, finance and security. Several companies are using AI and machine learning (ML) in analysing customer behaviour and improving their services. Thanks to digital marketing, social media and other related tools, AI has helped several small
companies in increasing the size of their geographical market and growing rapidly.

Chatbots are being increasingly used by firms for enhancing customer experience through helping customers with 24/7 availability and resolving basic queries. Chatbots are generally driven by AI technology such as ML and natural language processing, which helps them deliver a natural and customised user experience. They also deliver faster response rates as human involvement is not needed. Furthermore, chatbots are easy to build and easy to use, which boosts their increased adoption. In 2022, Gartner predicts that 70% of white-collar workers will be interacting with chatbots for higher speed.

- **AR / VR:** Augmented Reality (AR) and Virtual Reality (VR) are gradually becoming trends that are difficult to ignore. While the technology failed to catch up earlier due to the high cost of the gadget, slow adoption, bulky headgear, etc., its adoption is slowly increasing. AR/VR is gaining traction in multiple industries, from gaming and entertainment to retail and real estate. Shopping is getting revolutionised due to virtual viewing, trial rooms and more shopping options. The popularity is further growing due to pandemic-induced lockdown as well as the advent of the metaverse. Furthermore, to promote adoption, market leaders such as Microsoft, Google and Facebook are developing AR supported apps and technologies and working on optimising product technology and more app support among other features. The popularity of AR / VR has led to the development of Mixed Reality (MR) which is a combination of AR and VR where physical and digital objects co-exist.

- **Wearable Tech:** Wearable devices are becoming popular in recent years. People are interested in knowing their heart rates, pulse rates, steps taken, etc. and want to push themselves to get fitter. Smartwatches and fitness bands were commonly seen prior to the pandemic. Currently, demand for smart chest trap, smart glasses, smart show sole, etc. are also increasing. According to the International Data Corporation, India’s wearables market grew at a substantial 170.3% in the first three months of 2021 compared to the same period in 2020. Multiple platforms have started displaying live or recorded fitness lessons from certified professionals. Apps like Fittr and HealthifyMe are being used by many. Several apps also have AI-enabled monitoring to track workouts and make the overall experience more user-friendly.

The broader health-tech market is also witnessing exponential growth, especially due to the coronavirus pandemic. Health-tech includes services such as online video consultations by doctors, online medicine ordering and delivery, digital well-being. According to RBSA Advisors, an advisory firm, the health-tech market is expected to reach US$ 50 billion by 2023, registering a CAGR of 39% between 2020 and 2023.
• **Low-Code, No-Code**: Low-code, no-code solutions are increasingly being adopted as they require little or no coding. This allows non-technical employees and those with no coding knowledge to build applications. This facilitates automation of repetitive work, thus saving time and increasing efficiency. Indian IT firms such as Infosys, HCL Technologies and Tech Mahindra are building their own low-code, no-code technology. Gartner predicts that low-code technology will be responsible for more than 65% of application development by 2024. While complex applications would still be developed by talented developers, simple applications can be built using low-code, according to Ollie O’ Donoghue, senior analyst at PAC, a technology research firm.

• **Blockchain Technology**: Blockchain is a system of securely recording information. It is decentralised and public which makes hacking or manipulating it nearly impossible. Due to the rising popularity of cryptocurrencies, blockchain technology is rapidly gaining traction. Decentralised Finance (DeFi) and smart contracts are the new buzzwords. Blockchain-based play-to-earn games are also being downloaded. Such games pay users in the form of cryptocurrencies and use blockchain technology for tracking transactions. Non-fungible tokens (NFTs), which were mostly unheard of until two years ago, are rapidly becoming commonplace. NFTs are digital art which are bought and sold using blockchains. Mr. Amitabh Bachchan recently launched his NFT collection, which has well-known moments from his films. As the benefits of the technology become known, its uses are also expected to increase.

• **Quick Apps**: To use an app, downloading the app was required, even if the usage was temporary. It was a hassle and consumed time to download the app, use it and then, either keep it installed or uninstall it. With the invention of quick apps, this process has become much faster and efficient. Quick or instant apps allow users to install an app temporarily, without the need for installation. This is expected to enable users to try more apps and keep a few rather than not trying at all, thus reducing user hesitancy to try apps because of the hassle of downloading and installation apps before use.

**MAJOR APPLICATIONS MADE IN INDIA AND MAJOR APP DEVELOPERS**

This section provides information about popular apps made in India as well as well-known Indian app developers.

**Popular Indian Apps**

**MX Player**
MX Player is an Indian entertainment app developed by Times Group. Its features include a video player, video streaming, exclusive shows and web series, TV, songs and games. The app has more than 100 crore downloads on Google Play Store. The app focuses on producing shows in Hindi and other regional languages such as Bhojpuri, Punjabi, Tamil, Malayalam and Kannada.

**Ludo King**
Ludo King is a popular gaming app developed by Gametion. The app became especially popular during the pandemic as it enabled people to connect and play with each other at a time when everyone was in
their homes. The app has more than 65 crore downloads on Google Play Store. Ludo King is a classic cross-platform multiplayer board game. As the name suggests, it is the game of Ludo, the modern version of ‘Pachisi’, a game played between kings and queens in old times. To make it interesting and retain players, the game allows players to invite Facebook friends, include several themes, private chat and emojis. It also has the Snake and Ladders game.

Mylio
Mylio is developed by Jio Platforms Ltd, a subsidiary of Reliance Industries Ltd. Its features include mobile recharge, managing Jio devices, movies, songs, news, UPI and games. The app is particularly useful for Jio users as it enables them to easily recharge, view their mobile and data balance, amount due for payments and manage other Jio accounts. The app has more than 10 crore downloads on Google Play Store.

PhonePe
PhonePe is a well-known payments app. It was developed by Mr. Sameer Nigam, Mr. Rahul Chari and Mr. Burzin Engineer in 2015. The app was acquired by Flipkart in 2016. PhonePe is the leading player in the UPI market with a share of 49% in January 2022. Along with UPI, it includes features such as the PhonePe wallet and making payments of utility bills, mobile recharge, DTH and credit card bills. The app also allows users to renew insurance policies, invest in mutual funds and gold, buy gift cards and so on. The app has more than 10 crore downloads on Google Play Store.

Sandes
The Sandes app is developed by the National Informatics Centre (NIC), Ministry of Electronics and Information Technology, Government of India. It is similar to WhatsApp and other instant messaging apps as it enables communication between government organisations. The app runs using government infrastructure and supports end-to-end encryption and backup. The app provides features such as integration with other government communication systems such as DigiLocker and NIC email. Currently, the full features of the app are only available to users verified by the government. The app has more than 10 lakh downloads on Google Play Store.

Meesho
Meesho is an online shopping and fashion app. It allows users to buy lifestyle products and resale them enabling its users to earn money. The app boasts of having high quality products at lowest prices with discounts and free delivery. The app mainly sells clothing, but other products such as electronics, kitchen and home décor and daily use products are also available. The app has more than 10 crore downloads on Google Play Store.

MAJOR APP DEVELOPERS

Hyperlink Infosystem
Hyperlink Infosystem is a well-known app development company in India. Based in New York, USA, and India, the company was founded in 2011. The company offers a wide range of services which include development of apps, websites, games, ecommerce system, blockchain, AI and ML, and Internet of Things (IoT). The company has developed more than 4,000 apps and 2,000 websites. It boasts of large well-
known companies such as Google, Disney and Tata Power as its clients. It helped Tata Power with the development of the Tata Power Skill Development Institute App, an institute to educate and empower people, especially youngsters with employable skills in the power industry. The company also created the Zydus Verify app for Cadila Healthcare, a renowned pharmaceutical company in India. The app helps verify original Zydus medicines and injections with a unique code and prevent the usage of counterfeit drugs by customers.

**Tata Consultancy Services**
Tata Consulting Services (TCS) is India’s largest and one of the world’s largest IT services and consulting firms. The company offers a consulting-led approach to help customers. It provides a wide range of services such as analytics and AI, cloud, blockchain, app development, enterprise applications, and cyber security. The company was founded in 1968 and is based in Mumbai, Maharashtra.

![TCS Logo](image)

**Infosys**
Infosys is India’s second largest and among the world’s largest IT companies. The company provides services such as cloud, consulting, enterprise application development and outsourcing. The company was established in 1981 and was the first Indian IT company to be listed on the NASDAQ, an American Stock Exchange.

![Infosys Logo](image)

**Nazara Technologies**
Nazara Technologies is an Indian gaming, sports and entertainment company. It has presence in India, the USA, Africa, etc. The company has developed many popular gaming apps such as the World Cricket Championship, Chhota Bheem, Motu Patlu and other related games. The company has other apps in its portfolio which include its gamified e-learning apps and Sportskeeda.

**Jio Platforms**
Jio Platforms is a subsidiary of Reliance Industries and a major app developer. It boasts of apps such as MyJio, JioSaavn, a music app; JioTV, an entertainment app; JioChat, a messaging and calling app; JioMeet, a video-conferencing app; and so on.

**Other Major Developers**
Other major app developers include Tech Mahindra, Zensar Technologies, Capgemini India, Flipkart, HData Systems and Fueled.

**GOVERNMENT SCHEMES TO PROMOTE INDIAN APP DEVELOPMENT ECOSYSTEM**
The government has taken various steps to promote the Indian app development ecosystem directly or indirectly. These measures include helping start-ups as well as micro, small and medium enterprises (MSMEs) by providing financial incentives and easing regulatory burden. Some of the popular initiatives are listed below:

- **Digital India AatmaNirbhar Bharat App Innovation Challenge**: This programme was launched by MeitY in partnership with Atal
Innovation Mission – Niti Aayog to support and build a robust ecosystem for apps in India. The programme works in two stages. Track 1 will identify India’s best apps that are widely used and have the potential to scale and become world-class apps in their respective categories. Track 2 will focus on app development. The programme was launched in the form of a challenge to identify the best apps in different categories such as e-learning, social networking, health and wellness, productivity and work from home, etc. Start-ups and developers were encouraged to develop sustainable apps that may one day be used by the entire world. Such initiatives are expected to significantly help the Indian app development ecosystem.

- **Banning of Chinese Apps:** The government has banned approximately 224 Chinese apps since June 2020. The first round banned 59 apps including popular Chinese apps such as TikTok, Shareit, WeChat, Likee and UC Browser. This was as a means of protecting the sovereignty, integrity and defence of India and the country’s public order. MeitY stated that these apps were allegedly obtaining important permissions, collecting real-time, sensitive user data. This data was then transmitted to servers located in hostile country. This has benefited home-grown apps as they are trying to fill the vacuum. Indian companies such as Jio Platforms and platforms such as Roposo and Glance have gained a significant number of users and are now competing globally. App development increased as developers started developing gaming, video sharing and other apps to replace the banned Chinese apps.

- **Startup India:** This initiative was launched by the government with the aim of supporting entrepreneurs, building a strong start-up ecosystem and ‘transforming India into a country of job creators instead of job seekers’. The programme is managed by a dedicated team which reports to the Department for Industrial Policy and Promotion (DPIIT). The programme includes various reforms to help meet its objectives. The Startup India Plan was formulated and is divided across the following broad areas:

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<th>Section</th>
<th>Details</th>
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<td>Simplification and Handholding</td>
<td>This section aims to reduce the compliance burden of start-ups so they can focus on their core business, create a single point of contact by establishing the Startup India Hub (which will also be in the form of a mobile app), providing legal support, fast-tracking IP applications, and providing a faster exit, i.e. winding up of operations.</td>
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<td>Funding Support and Incentives</td>
<td>This section aims to provide monetary support to start-ups. The reforms include establishing a fund of funds to invest in start-ups, providing credit guarantee and tax exemption to start-up investors on their capital gains as well as to start-ups on their profits.</td>
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<td>Industry - Academia Partnership and Incubation</td>
<td>This section aims to help start-ups by educating and training founders and helping them build connections. This would be done by organising start-up fests, promoting innovation through building labs and incubators, providing seed funding, building innovation centres and research parks, and providing training and competition challenges to students and founders.</td>
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• **Digital India Programme:** The Digital India Programme was launched by the government to transform India into a digitally empowered society and a knowledge economy. The programme aims to ensure that the services provided by the government would be accessible to Indian citizens electronically and enhance internet technology by improving connectivity. The government plans to leverage information and communications technology (ICT). Use of new technology such as cloud and mobile systems would be used, and interoperability and integration would be focused on. Successes would be identified and replicated.

• **Mobile Seva AppStore:** Similar to Google Play Store and Apple Appstore, the Indian government has launched its own app store called Mobile Seva AppStore in March 2021. The AppStore hosts government apps and encourages private apps to list themselves.

**HOW APP DEVELOPMENT FUNDING WORKS**

Funding is an important component in the app development process. A person may have a good idea or a dream and may want to convert it into an app. However, there are a lot of things which need to be done to make the app successful and many of them require capital. Without proper funding this may not happen.

Procuring funding for an unproven app is difficult. Owing to the growth of venture capital and government reforms, access to funding is relatively easy today compared to a few years earlier. Given below is the process for raising funds for app development.

• **Answering the right questions:** Prior to raising funds, the app developer must find the answers to the following questions as they may be asked by potential investors.
  - The expected amount needed for:
    - Developing the app
    - Running the app after development
    - Getting traction
  - Monthly burn rate, i.e. the expected amount of money the business is expected to spend each month.
  - The available funding options and the pool of potential investors interested in funding.

• **Know your App:** Knowing the strengths and weaknesses of the app is crucial. Strengths may include knowing which problem the app solves, which niche it fits and how it is better than its competitors. Weaknesses include knowing the competitors and finding and resolving the bugs and other issues which may be encountered. The developer needs to make plans to work on the app’s weaknesses.

• **Minimum Viable Product (MVP):** Creating a Minimum Viable Product (MVP) or a prototype is a crucial step in the app development funding process. An MVP allows the investor to get an idea about the business model and the app itself. The MVP
may be an app which includes key features. If the product is beyond the MVP stage and already earning some revenue, the chances of getting funding are higher.

- **Valuation**: Getting the app-based business valued is another important step to avoid giving away too much of the company at an early stage.

- **Perfecting the Pitch**: The pitch must be short and include the most important details about the app, along with the problem it solves. An investor may give a short time such as 30 seconds for the developer to deliver their pitch. Furthermore, the developer must be ready to answer investor’s questions. The developer may also need to prepare a pitch deck, a presentation consisting of details about the business opportunity, the business model, and so on.

- **Sources of Funding**: There are various sources of funding which the developer may access. Some of these are given below:
  - **Bootstrapping**: Bootstrapping means funding the app development with the developer’s own funds. In this case, the developer does not raise outside capital. Scalability may be limited, and the developer may have to rely on their own expertise. However, the developer does not have to part with equity at an early stage.
  - **Friends and Family**: The developer may raise funds from their friends and family. The amount of funding available through this source may be higher compared to bootstrapping, but access to professional guidance may not be available. Unlike bootstrapping, the developer may have to part with some equity.
  - **Crowdfunding**: Crowdfunding is a method of funding in which the developer raises funds from several people including potential customers. The funds may be raised as equity or preferred stock, or in the form of pre-sales where the customers pay for a product, which they receive in future. There are several crowdfunding platforms available such as Kickstarter and Ketto. However, there is tough competition on these platforms, and it may prove difficult for the developer to attract attention to their app and raise sufficient funds.
  - **Website / App Donations**: To avoid the competition on crowdfunding platforms, the developer can opt for website donations whereby customers and visitors may contribute towards the development and post-development operations of the app. However, the developer may not be able to raise the required funding from donations alone.
    - **Angel Investors**: Angel investors are individuals or firms which provide funding in early stage and want equity in return. Angel investors may assist developers in running their app-based business by helping them with their expertise, connections, etc. Furthermore, the amount of funding is generally higher than from bootstrapping and friends and family.
    - **Venture Capital**: Venture capital firms are, in some ways, like angel investors. They ask for equity for the funding. They may take board seats and provide their expertise and connections
to industry leaders, other portfolio firms and so on, to help the business become more efficient and grow faster. Furthermore, the amount of funding provided may be the highest.

Other funding options may include private investors, bank loans, app funding contests organised by universities and foundations and incubators.

**OUTLOOK**

The Indian app development industry is booming in line with the growing technology industry. This is due to the availability of smartphones, better and wider internet connection, and growing appetite of the Indian population. Due to the ease and lower cost of developing apps and digital marketing compared to setting up brick-and-mortar stores, small businesses are increasingly going online for selling their goods and services. This has led to market expansion, going from local to global and, helped them prosper. Investor’s risk appetite has also increased which has resulted in larger private equity and venture capital investments. This has also increased capital raising options for app developers. India is one of the world’s leading countries in app downloads and time spent on mobiles. Data.ai reported that 27 billion apps were downloaded in 2021 in India, up 41% from 2019. As per 42matters, an app intelligence website, about 3% of total app publishers are Indian and around 5% of total apps are made by them. These statistics suggest high growth opportunity as well as enough room for growth. Incentivised by government reforms and presence in a huge market, Indian app developers are likely to experience exponential growth. Already, we are seeing popular Indian apps competing with global players. This trend may continue as Indian players expand into untapped global markets and fill niches, turning India into a global technological powerhouse.