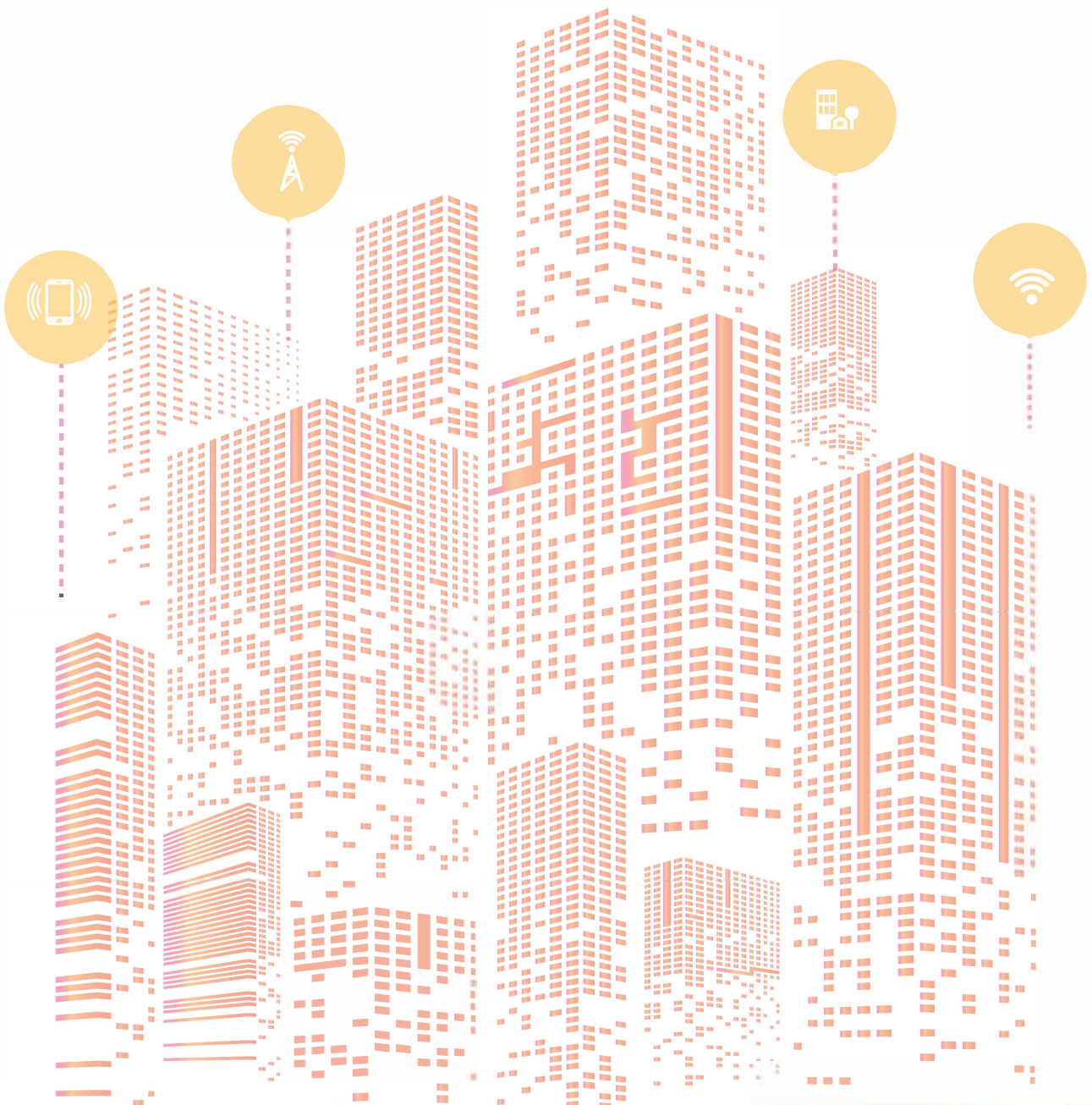


2021

PROPTech

THE FUTURE OF REAL ESTATE IN INDIA



CEO Speaks



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The enforced lockdown to contain the coronavirus's spread has seen an increase in the appetite for digital platforms worldwide. Many sectors such as retail, banking and finance, education, and healthcare have seen an uptick in the use of technology and online consumer pool. One sector that intuitively would not have been expected to see a big boost but benefitted significantly is PropTech, which, simply put is use of technology across the real estate life cycle.

While growth of the industry in the Asian region has yet to reach a level seen in their western counterparts, the online business platforms have been on the radar of investors since 2009, but it is only in recent years that technology has taken center-stage with investments in PropTech reaching USD 513 million in 2018, crossing the USD 500 million-mark.

The circumstances arising out of the new norms of social distancing and restrictive movement have further propelled the interest in the sector. Corroborating the attractiveness and the potential of technology penetration in the Indian real estate market, PropTech investments in India surged to USD 551 million in 2020 despite the global uncertainty amid COVID-19 pandemic – A record year for investments compared USD 549 million in 2019.

As we all adjust to the new normal, both developers and consumers alike, are warming up to the use of digital offerings in the real estate space with sales and marketing or digital business platforms coming to the forefront. The average deal size for tech investments in this segment grew to USD 70 million in 2020, the highest compared to other segments such as shared economy, interior design services, furniture rentals, and construction technology.

If these platforms were only popular to find and finalize properties in the pre-pandemic era, the pandemic has changed much of that, with digital classifieds evolving from being mere mediums to offering full-stack solutions towards discovery, advisory and transactional support. A result of the confidence induced by the digital platforms; our survey findings suggests that 37 percent of the potential homebuyers are confident to buy a home completely online with a single on-ground site visit – something that could not have been thought of even until a few years ago.

As we ride this third-wave of the tectonic shift in the real estate value chain, technology penetration and acceptance of digital enablers such as drones, virtual reality, Internet of Things (IoT), big data, artificial intelligence, block chain and software as a service (SAAS) will take center stage in the mostly organic fabric of the Indian real estate sector, and it would not be wrong to say that the next decade belongs to PropTech.

Stay safe and take care!"

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PROPTech KALEIDOSCOPE

Concept

Simply put, PropTech is an acronym used for describing the digital transformation and the use of technology innovations to disrupt the rather organic real estate space. This tech transformation of the sector is helping the real estate space in easing and streamlining processes for all stakeholders across different stages of the real estate market, making it more seamless, efficient and transparent.

“PropTech is one small part of the wider digital transformation of the property industry. It describes a movement driving a mentality change within the real estate industry and its consumers regarding technology-driven innovation in data assembly, transaction, and the design of buildings and cities.”

- James Dearsley and Professor Andrew Baum¹

The increase in the use of technology is driving a sea change across sectors. For instance, automation through use of robotics and artificial intelligence (AI) is transforming the manufacturing industry, thus making it faster and more efficient. Big data analytics is being extensively used in sectors such as banking, retail, education, and entertainment to understand market trends and consumer preferences to make more informed business decisions. On the consumer end, easy access to smartphones and mobile internet connectivity has facilitated an increase in the use of digital platforms in nearly all spheres.

While the use of digital technology and the internet is rapidly transforming different industries, its penetration in the real estate sector has been a straggler due to its heterogeneous and capital-intensive nature.

Also, since the real estate market is organic in nature, especially in countries such as India, where the sector is still evolving, the use of technology in the project life cycle has not garnered as much interest as other sectors.

However, in the past few years, it has been observed that the push towards digital transformation has been immense, and that, coupled with the need-based use of technology in the current pandemic, has positively accelerated the use of technology in the real estate sector. The sector today is more than ready for the adoption of technology across the supply chain, enabling market access, problem-solving, transparency, efficiency, speedy delivery, and an enhanced customer experience for more informed decisions.

Stakeholders have realised the value add of technology in the real estate asset lifecycle and thus, digital disruption is being confirmatively looked at as the now and future of the real estate sector.

¹James Dearsley is co-founder of Unisuu, a global leader in PropTech information, data and research.

Professor Andrew Baum is Professor of Management Practice at the Saïd Business School, University of Oxford

SEGMENTATION: A DIFFERENT MANY THINGS

PropTech is a vast canvas that is dynamic in nature, and the companies providing technological services to the sector can cater to various market segments, depending on the stage in the lifecycle of the property. For instance, digitisation of land records takes place with the help of drone mapping, Geographic Information System (GIS) and blockchain technology, thus aiding in land management and making it more efficient.

Further, in case of construction of property, technology is being used in architectural design and engineering by way of different software for the preparation of computer-aided design, building information modelling (BIM) and virtual and augmented reality (VR / AR) to speed up the process of design and aid in visualisation. In case of building materials, 3D printing technology helps in reducing the overall project cost and wastage of material. Similarly, the use of robotics in tasks such as bricklaying improves the speed and quality of construction, making the process more efficient.

Apart from design, planning and construction, technology also plays a crucial role in the sales and marketing aspect, by way of targeted marketing of the property.

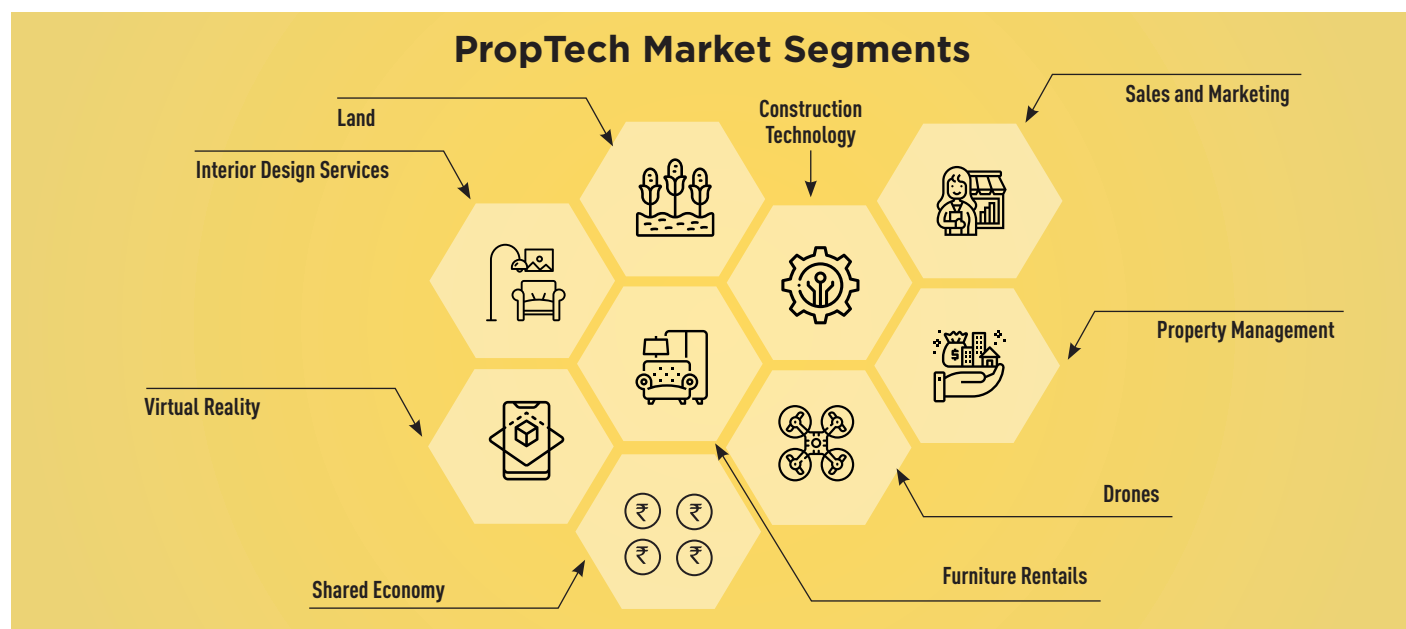
Keeping up with the changes, many digital platforms have surfaced over the past few years, where commercial and/or residential properties can be listed and advertised

for buying, selling, renting, or leasing. What's more, technology is also being used to manage and maintain property through automation and 'smart' equipment, thus increasing buildings' efficiency and bringing ease and convenience to day-to-day household chores.

Technology such as big data and AI is also being used by owners in the management of tenants and properties, and also to provide quick solutions to the queries and problems faced by residents.

Not only this, digital platforms for services such as interior designing and furniture rentals have also surfaced in recent years and are being utilised by both sellers as well as consumers for customer-centric specifications. Similarly, technologies such as virtual reality (VR) and drones are being used in sales and marketing for an enhanced consumer experience.

The penetration of technology in the real estate sector has, however, been moving at a snail's pace with very few milestones up its sleeve. However, the last few years have brought in noteworthy structural shifts that have made 'PropTech' a buzz word in the real estate sector. These advancements can be broadly categorised into three prominent waves of change that are driven by technological innovations and the increase in the use of digital technology by a broader population.



THE GENESIS: WAVES OF CHANGE

First wave

The first wave of change began in the 1980s, when the real estate sector witnessed an increase in the use of technology due to the availability of personal computers. These personal computers came equipped with tools such as spreadsheets and made data documentation and analysis faster and efficient. Several companies, such as Argus, Yardi, CoStar, LoopNet, etc., were launched during this period and specialised in providing technology-based services for data analytics and marketing in the real estate sector. Also, the launch of software products and services such as Autodesk in 1982 facilitated computer-aided designing and 3D modelling, positively impacting the field of construction technology.

Also, as internet technology became more accessible to a wider range of population, new companies in the form of online aggregators were born in the digital classified space in early 2000s and provided services in the form of online platforms for listing residential properties to buy, rent, sale and lease. Not just in India, companies such as Realtor.com, Trulia, Redfin and Zillow in the US, Zoopla and Rightmove in the UK, and PropertyGuru in Singapore were also launched during this period.

These companies began to disintermediate reigning information providers by leveraging the dot.com boom to scale across a large userbase and become industry standard platforms.

The real estate classified ads turned to digital platforms from conventional newspapers, for a more cost-effective solution for marketing and listing properties. An increased consumer appetite for online real estate information was instrumental in the paradigm shift in the real estate industry in early 2000.

Second wave

The second wave of change can be marked as one after the Global Financial Crisis (GFC) in 2008, when technologies such as cloud computing, data processing, internet broadband and smartphones had begun to surface. The use of these technologies in the real estate

sector significantly aided in the storage and analysis of large amounts of data. Also, the smartphone revolution, internet and 'apps' helped in providing consumers instant access to various digital platforms.

These technologies helped in fueling the ambitions of the existing PropTech companies and ushered in newer ones, which aimed to make the physical space more fungible. Leveraging a shared economy, companies such as Airbnb and WeWork came to the forefront. This period took on from the previous era and sought to provide a richer user experience in renting, buying, selling, and building of physical spaces.

Third wave

The third wave in the sector has started with the current pandemic acting as a catalyst in accelerating growth and readiness in the sector at lightning speed. The use of technology in real estate has shown considerable growth since 2008, which is evident from the investor interest in the not-so-favorite real estate sector.

The sector is moving towards consolidation, albeit with fewer seed and angel-backed startups; however, the funding activity peaked in 2019 with a record high of USD 31.6 billion investment in real estate tech spanning across 528 deals. These investments include debt and/ or equity investments in technology and innovation companies in real estate.

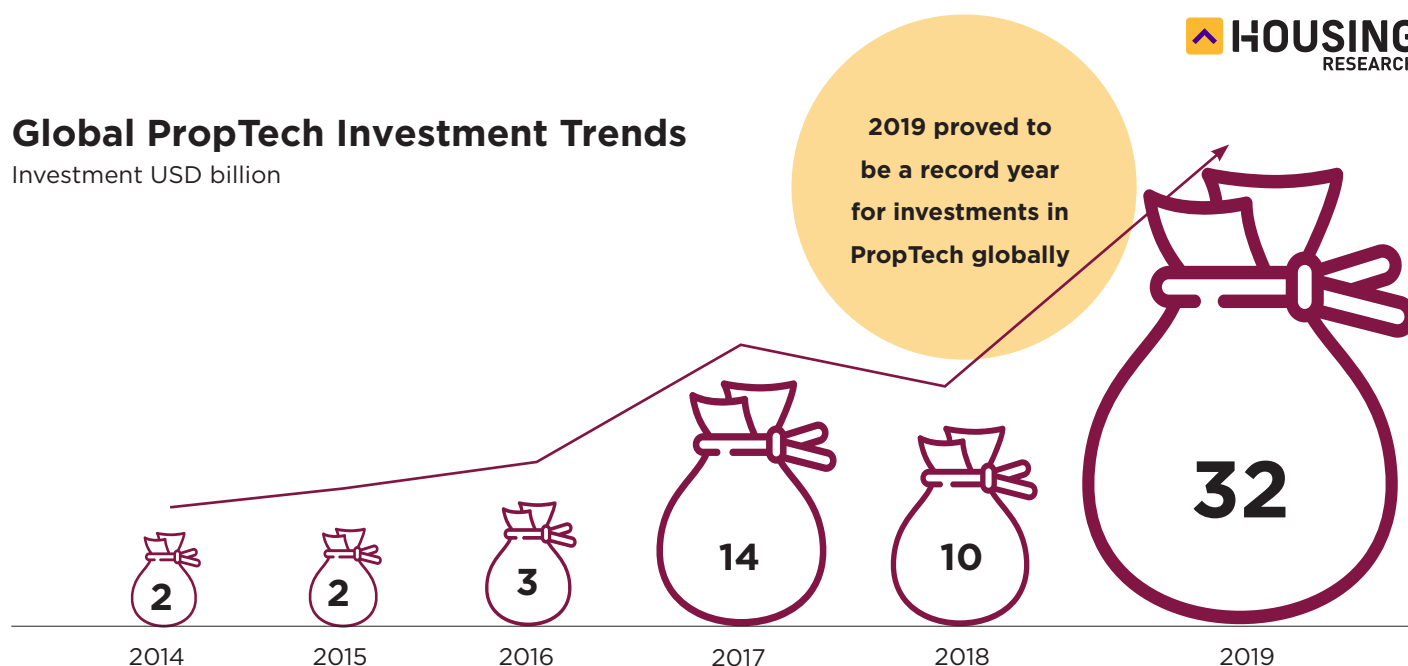
Marching to 2020, although funding in the sector took off with an impressive start, COVID-19 has acted as a dampener for the 227 percent growth momentum of the preceding year.

In these uncertain times of the global pandemic that has adversely affected several economies around the world, though it is difficult to predict the timing and quantum of impact that PropTech will have on the real estate sector, the need-based use of technology in ways that were incomprehensible a few years back has undoubtedly multiplied the digital acceleration within the sector.

As we ride the third wave of this tectonic shift in the real estate value chain, it can safely be said that technology penetration and acceptance in the sector is set to increase multifold in the near future.

Global PropTech Investment Trends

Investment USD billion



Source: CREtech End Year Report, 2019

Waves of Change in the PropTech canvas

First wave

- Began in 1980s with the use of personal computers.
- Companies that specialised in providing technology-based services for data analytics and marketing were launched for real estate sector.
- Increase in application of computer-aided design and 3D modelling after launch of software products and services such as AutoDesk in 1982.
- New companies launched in early 2000s, which provided services in the form of online platforms for listing of residential/ commercial properties to buy, rent, sale or lease.
- The first wave ended in early 2000s.

Second wave

- The second wave began post the global financial crisis in 2008.
- This wave was driven by use of technologies such as cloud computing, big data, smartphones and mobile internet.
- Launch of companies providing shared services such as co-living and co-working.
- Consumer experience took centre stage during this period.

Third wave

- The current pandemic has acted as catalyst for the third wave
- The necessitated use of technology in current scenario has multiplied digital acceleration.
- Blockchain, internet of things, machine learning and artificial intelligence to play a key role going forward.



SELECT



PROPTech GLOBAL RECALL

Although PropTech is a global phenomenon, maximum number of companies in the sector are concentrated in the US and Europe. In Asia, PropTech made an impression only post-2000s, and the markets are still inchoate compared to their western counterparts. Currently, a majority of PropTech companies in Asia are concentrated in China, India, and Singapore (approximately 70 percent), while the remaining companies are largely distributed over Japan and south-east Asia.

India makes for a fascinating case for PropTech with its population of 1.3 billion, and a real estate sector that is slated to reach USD 1 trillion by 2030² and is expected to contribute 13 percent to India's GDP by 2025.

A fast-growing middle class, rapid urbanisation, adoption of technology, an increasing internet userbase of over 500 million users, a young demographic base, and a gradually consolidating real estate canvas are factors that are powering the growth story of PropTech in India.



Global PropTech footprint and India impressions

Country	No. of Companies	Internet Users (in million)	Internet Penetration (as per population) %
World	4,053	4,131	54
USA	864	287	87
UK	329	62	93
France	133	54	83
Germany	106	74	88
Australia	137	22	87
India	322	504	40
China	102	860	60
Singapore	62	5	89
Japan	17	108	85

Source: Tracxn, Startup India, IAMAI, International Telecommunication Union – United Nations, Housing Research

DRIVERS OF DIGITAL TRANSFORMATION IN INDIA

2nd

Largest internet user base in the world, next only to China¹



71%

Internet users aged between 20 to 49 years⁵

40%

Internet penetration⁴

99%

Prefer smartphones to access internet³

500

million

Smartphone users by end of 2020²

416

million

More urban dwellers to be added in between 2018-2050⁶

63rd

Rank in world (2020)⁷

142nd
rank in 2015

Government Initiatives

Digital India

Use of digital technologies in different areas such as e-governance, online payment transaction, healthcare, tourism, safety and security, etc.

Smart City Mission

Use of digital technology such as e-governance, digitisation of records, online redressal platforms and improved digital infrastructure for seamless internet connectivity in Indian cities.

Foreign Direct Investment Policy

100% foreign direct investment in sectors such as telecom services, electronic systems and e-commerce activities which aid in growth of digital technology.

1 International Telecommunication Union

2 Google with Boston Consultancy Group

3 4 5 IAMAI with Nielsen 2019

6 United Nations

7 World Bank

PROPTech INDIA

2.4



USD billion
Invested in PropTech between
2009 to 2020

57%

CAGR growth in investments
between 2010 to 2020



225

Deals in between 2009 to 2020

0.55



USD billion
Investment in 2020 - highest till date

PROPTech IN INDIA

In India, the real estate sector has not changed much in decades, with a majority of the sector heavily dependent on intermediaries and working in an unstructured fashion. However, as technology takes centre stage, the real estate sector cannot help but notice the disruptions that are changing the face of this mostly organic sector.

Although globally, the use of technology in real estate has been gradually increasing, India has been a laggard due to low acceptance of technology in what is a highly fragmented sector, where no two parallels can be drawn, and no two markets can be compared. For instance, unlike the western countries, the land records in India are highly fragmented, manually made, and ill-maintained, all of which often poses challenges in deciding land ownership, leading to litigations and disputes. Similarly, the buying, selling and renting of the ensuing product is done more organically, and involves a person-driven or a word-of-mouth approach.

However, in the past few years, real estate has attracted considerable investor interest, with the potential growth prospects of the sector in India. Expected to reach a market size of USD 1 trillion by 2030, the real estate sector has undergone some major structural reforms such as demonetisation, the Real Estate (Regulation and Development) Act 2016 (RERA), and the goods and services tax (GST), which have not only straitjacketed the industry, but have also brought the much-needed transparency in processes, making it lucrative for private markets.

The potential shown by the sector has expanded the canvas for private markets in India over the years, with investments surging to an all-time high in 2020. Despite the COVID-19 pandemic induced economic blow, private markets clocked USD 55 billion of capital inflow across 788 deals in 2020, as against USD 50 billion in 2019.

Growing at a decadal compound annual growth rate (CAGR) of 18 percent, private equity investments in India have largely been concentrated in banking, financial services and insurance (BFSI), consumer/ retail, telecom, and IT products and services segments.

Investments in the real estate sector which includes investments in PropTech, have been growing at a CAGR of 10 percent and has received close to USD 36 billion in private equity and venture capital investments between 2015 to 2020. A significant 30 percent of this investment was received singularly between 2019 and 2020.

These investments have spanned across segments such as warehousing, residential, commercial, and mixed-use development, of which investments in residential make for a handsome 30 percent share of the overall pie received since 2015.



Sector attractiveness for investments in digital space in India

Sector	Investment	Number of Deals	Digital Investment Score***
Advertisement and Marketing			
Banking, Financial Services and Insurance			
Education			
Entertainment			
Healthcare			
Tourism and Hospitality			
Infrastructure			
IT Services & Products			
Others*			
Real Estate**			
Retail			
Telecom Services			
Travel and Transport			

Low  High

Source: Venture Intelligence, Housing Research

The investments tracked include private equity, venture capital, debt, PIPE (Private investment in public entity), project level investments, pre-IPO private equity deals, at the early, growth and late stage.

*Others include Manufacturing, Energy, Shipping and Logistics and other services

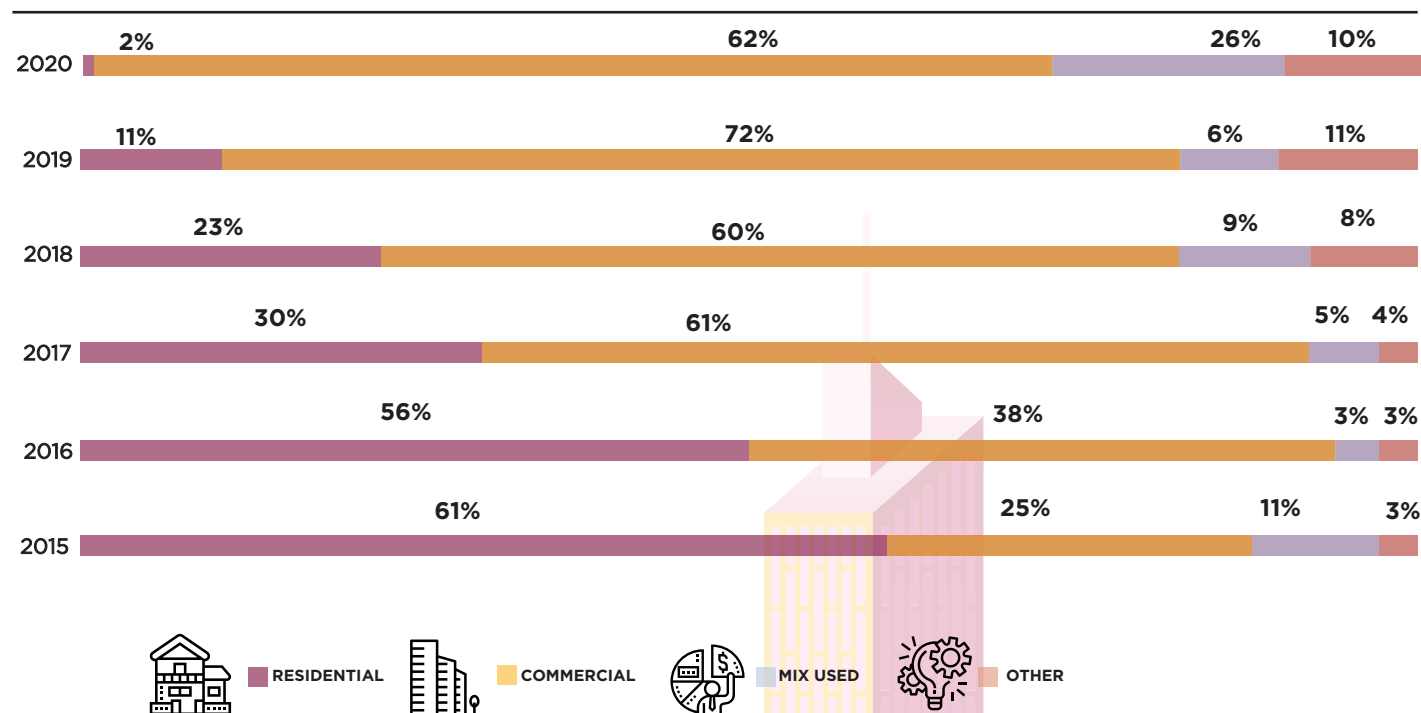
** Real estate includes deals and investments in real estate asset, PropTech and other real estate companies

***Digital Investment Score is calculated through weights on number of deals, total investment and investment in the digital space in the particular sector. (Refer Annexure for methodology)

The commercial segment, due to its rent-yielding assets (offices, warehouses, malls, etc.) and the availability of an exit option in the form of real estate investment trusts (REITs), has been the most preferred amongst global investors. The share of investments in the segment has significantly increased to a whopping 62 percent in 2020, as compared to 25 percent in 2015.

In contrast, the share of the residential segment has been reduced to a mere 2 percent in 2020, as compared to 61 percent in 2015. Several factors have played their part in the waning of investor interest in the residential segment. Sluggish demand, steep capital values, construction delays, and various other litigatory hurdles, coupled with the NBFC debacle, have kept investors away from the residential segment.

Share of investments in the real estate sector as per asset class



Source: Venture Intelligence, Housing Research

Residential includes residential and township; Commercial includes office, retail, warehousing, Special Economic Zones (SEZ) and Real Estate Investment Trust (REIT); Mixed use includes mixed use and diversified; Others include PropTech and other real estate asset classes

The investments tracked include private equity, venture capital, debt, PIPE (Private investment in public entity), project level investments, pre-IPO private equity deals, at the early, growth and late stage.

PROPTech DISRUPTION

As an evolving sector, interconnected factors such as demographics, business structure, urbanisation, consumer behaviour, and globalisation have played a significant role in shaping the demand dynamics of real estate in India. These advancements have thus caused unforeseen disruptions in its value chain across asset classes. Innovation, product offering changes and new business structures, competitive strategies, and operating and transaction models are some of the tectonic shifts that have caused unprecedented waves in the otherwise placid Indian real estate sector.

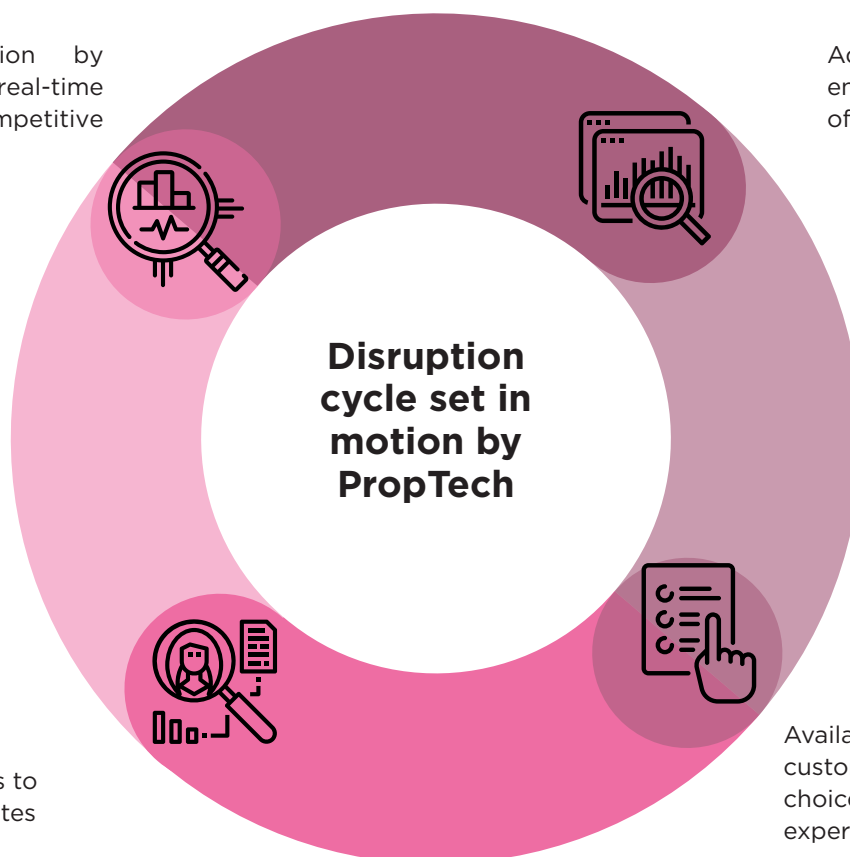
Along with self-advancement, various government and policy reforms have also realigned the intermediary-dependent sector post the formation of RERA guidelines, which have brought about consolidation in the sector with only a few key players remaining in the field. This increase in awareness, changing demand dynamics, and the advancement of technology has warranted the sector to sit and take note of the augmentation in its value chain across various stages of construction, asset management, and sales and marketing. Together, the above factors are paving the way for a more organised and efficient sector experience.

Technology adoption by firms, and access to real-time data enables competitive differentiation

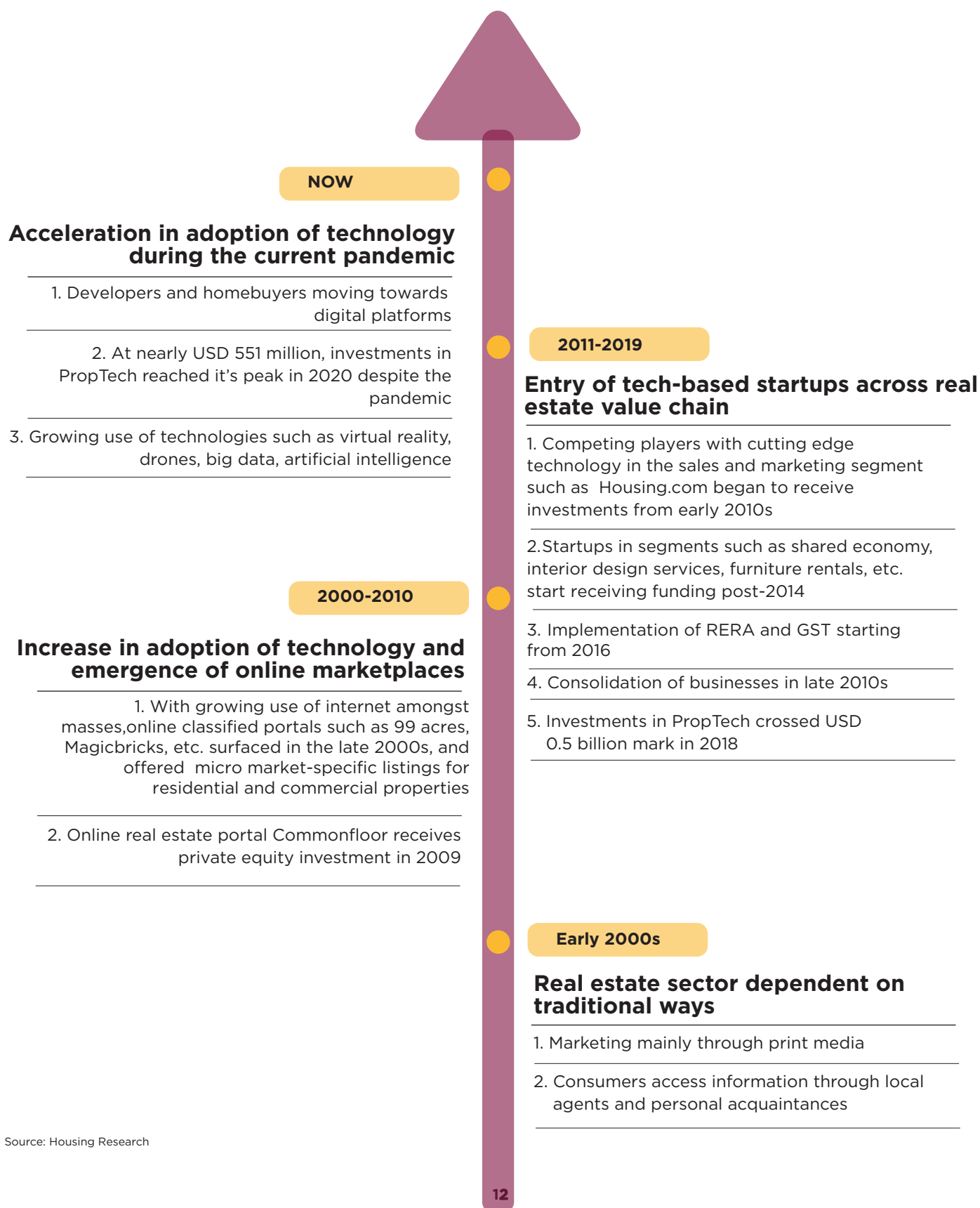
Adopting new technology enables access to an array of options in the market

Evolving consumer behaviour and access to multiple choices creates competition

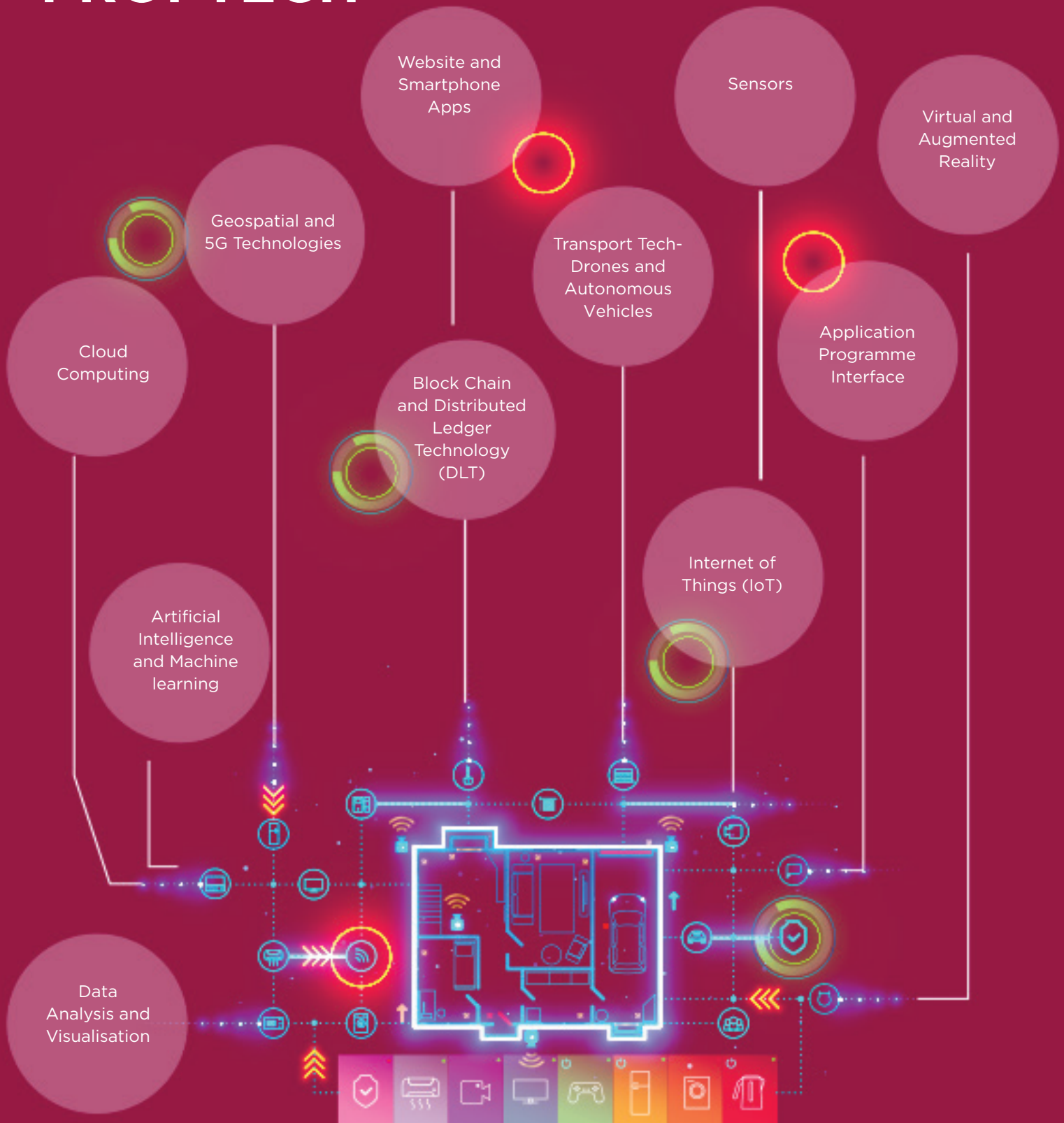
Availability of instant and customised options increase choices and make consumer experience better



EVOLUTION OF PROPTech IN INDIA

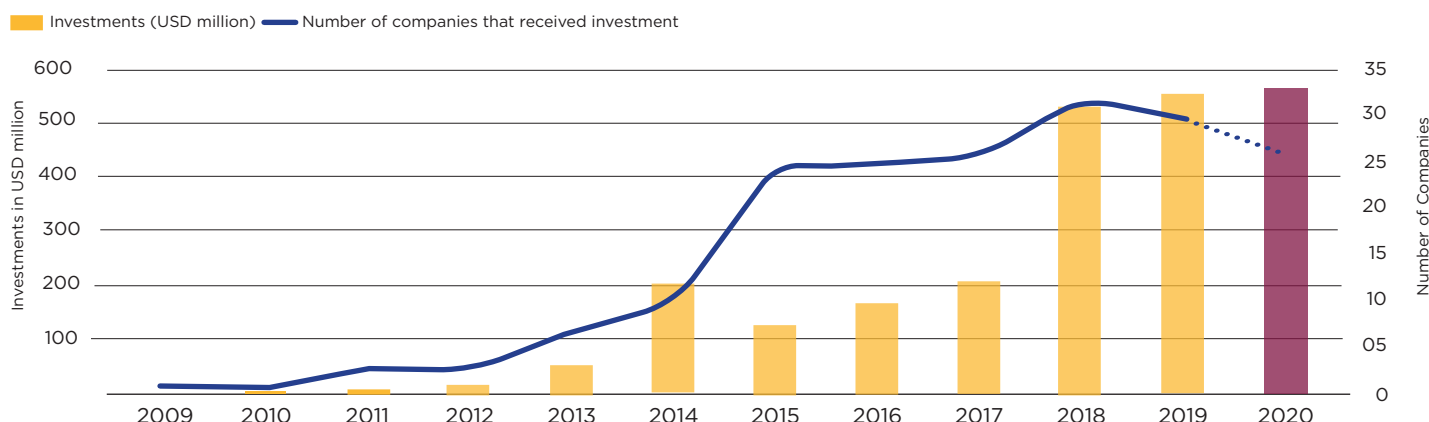


TECHNOLOGIES UNDER PROPTECH



Source: Housing Research

Private markets continue investment momentum in PropTech

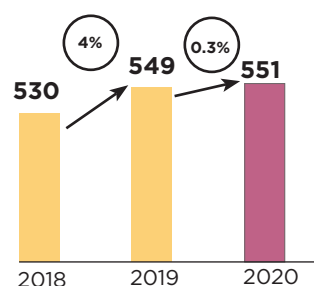


Source: Venture Intelligence, Housing Research

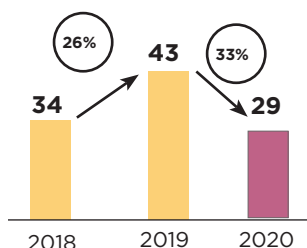
The investments tracked include private equity, venture capital, debt, PIPE (Private investment in public entity), project level investments, pre-IPO private equity deals, at the early, growth and late stage.

Marginal uptick in deal value in 2020 despite pandemic

Deal Value (USD million)



Deal Volume



Source: Venture Intelligence, Housing Research

The process of digitisation is heavily being integrated across the real estate value chain, from mapping to end-user engagement. The use of technology in the construction (ConTech) sector for the planning, designing, and building phase of an asset is witnessing an increase in investments, as well as with other technologies that are dedicated for business interface between a customer and business at the liaison stage.

New-age technologies such as big data and analytics, IoT, automation, cloud computing, augmented/ virtual reality (AR/VR), AI, blockchain and drones have increasingly found applicability in the Indian real estate fabric.

Investments in PropTech have been growing at a CAGR of 57 percent since 2010, making it attractive segment in the real estate sector.

The thrust of technology in various segments of real estate is evident from the investment inflow post-2015. Capital inflow in PropTech has seen a robust CAGR of 57 percent from a rather humble start in 2010 when investments were below the million mark. A majority (67 percent) of these investments were received in between 2018 and 2020.

Despite 2020 being largely defined by the global pandemic and unprecedented economic challenges, private market investment in PropTech in India surpassed 2019 levels at USD 551 million.

The double power acceleration of technology in the real estate sector in the current times will prove to be a silver lining for the stressed sector in the near future. .

BUSINESS PLATFORMS: THE BLUE-CHIP SEGMENT IN PROPTech

Shared economy, and sales & marketing most lucrative for investments

Segment-wise share of flow in PropTech in India (2015-2020)*

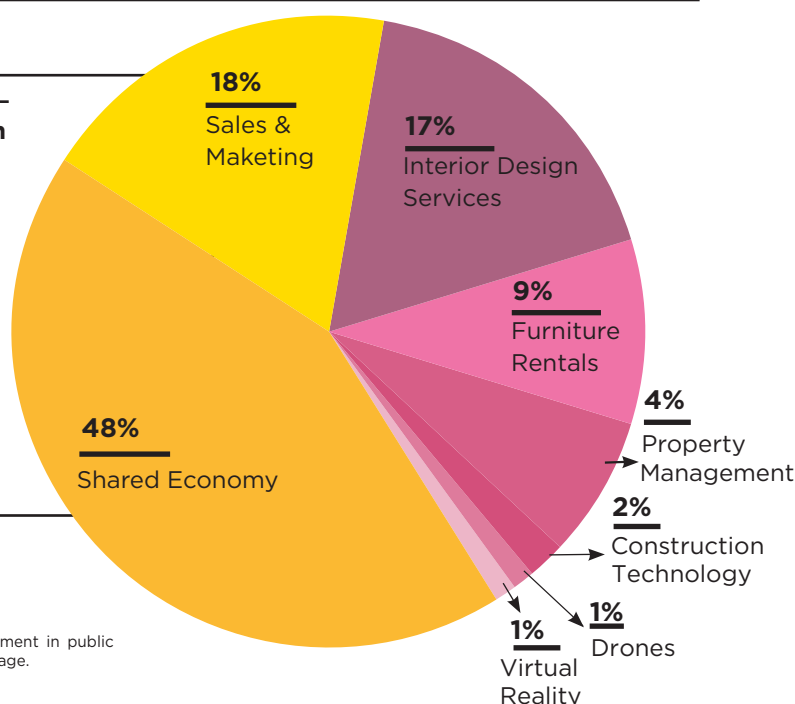
Business platforms : The Blue-chip segment in PropTech

	Private equity investments (USD million)		CAGR (2015-2020)	Average deal size (USD million)	
	2015	2020		2015	2020
Sales & Marketing	26	70	22%	4	70
Shared Economy	60	198	27%	7	33

Source: Venture Intelligence, Housing Research

*Total PropTech investments between 2015-2020 stand at USD 2.1 billion

The investments tracked include private equity, venture capital, debt, PIPE (Private investment in public entity), project level investments, pre-IPO private equity deals, at the early, growth and late stage.



Although investments in the shared economy take up a major piece of the pie, its average deal size is significantly lower than sales and marketing, or the business platforms. The average deal size of investments in sales and marketing in the real estate sector has grown to USD 70 million in 2020, as compared to USD 33 million of investment in the shared economy segment.

Business platforms have been on the block since 2009 and have evolved ever since, from being mere mediums for digital classifieds to offering a full-stack solution towards discovery, advisory and transactional support.

However, the penetration of use of business platforms for real estate buying and selling has been slow considering that it was introduced in India a decade ago. According to Housing Research the brokerage housing market is approximately USD 1.4 billion³, of which a majority of business is conducted through offline mode.

But even with the actual transaction culminating offline, over 50 percent⁴ of the real estate buying decisions take place through online searches, and with the growing internet userbase that is expected to increase up to 1 billion by 2025⁵, the opportunity for players in this segment is colossal.

³ Brokerage market size is estimated on the total sales value of residential units in the top eight cities post the implementation of RERA in 2017. The share of brokerage in sales is assumed to be 1 percent of the total sales value

⁴ Pan India offline research conducted by Zinnov, 2014

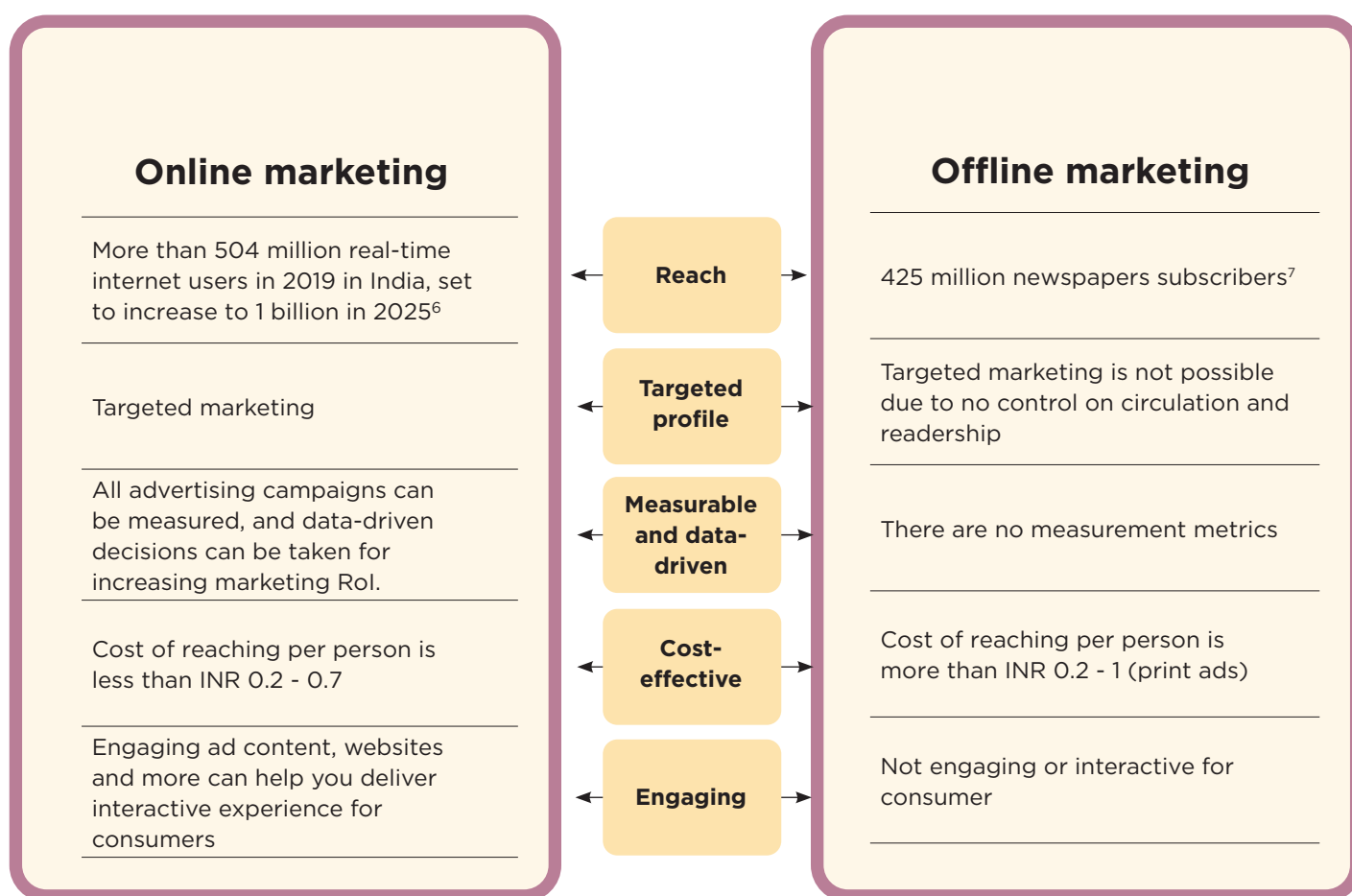
⁵ IAMA, ITU, Housing Research

We believe that with the changing consumer behaviour towards buying a house and the digital penetration with the right demographics, digital wallet usage for real estate will increase significantly.

Also, digital media has now become the mainstay of real estate marketers, with developers pivoting their marketing strategies towards digital platforms. Apart

from increased brand awareness, continued engagement, and full stack services such as advice, financing support, drafting of agreements, and interiors, the online segment offers comparatively less cost-per-lead when compared to traditional outdoor or full-jacket print campaigns, thus making it advantageous for developers.

Online marketing is a clear winner in consumer outreach and cost effectiveness



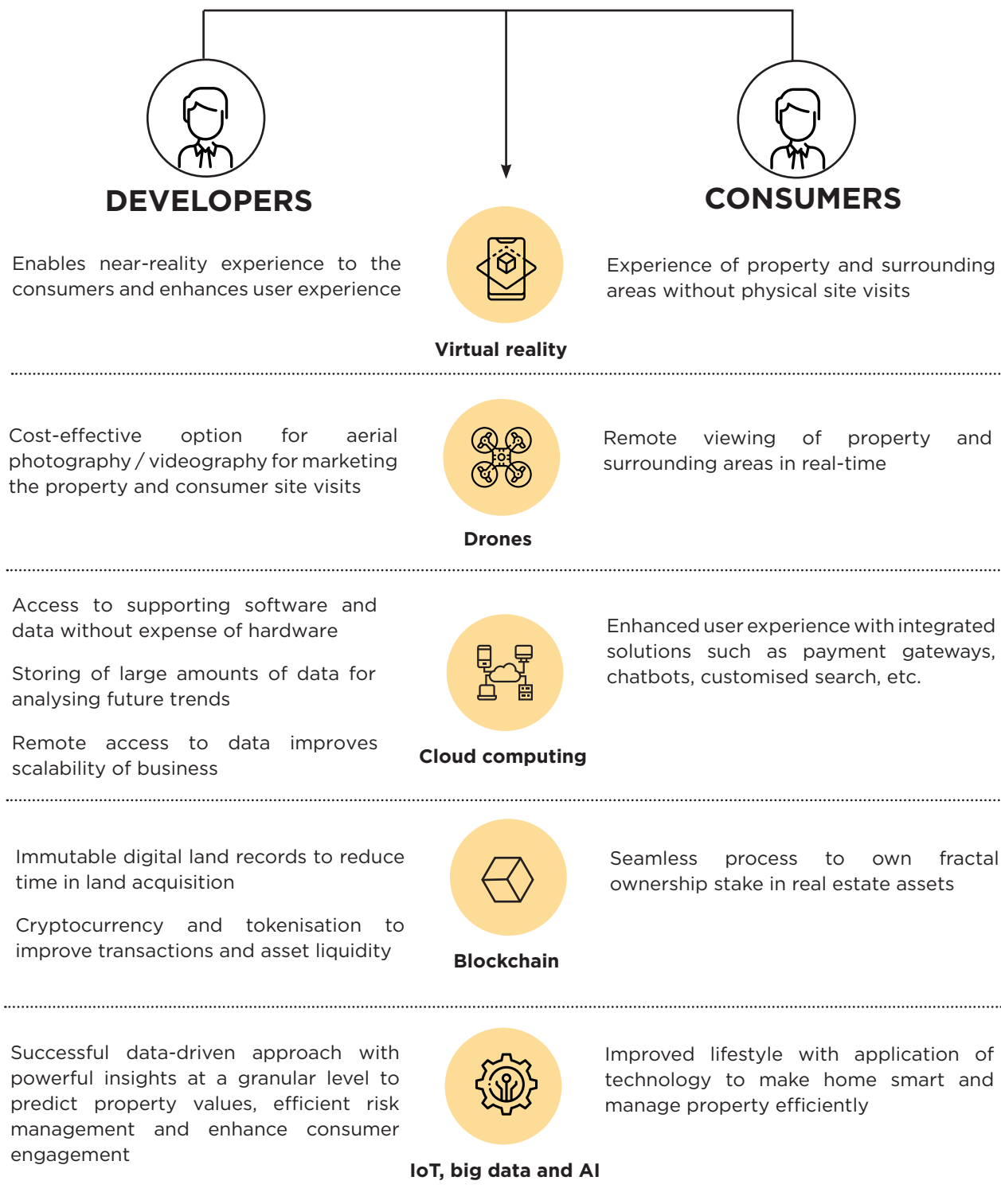
To bring all this together and present it in the most accessible manner, online tools such as drone view tours, virtual tours, and webinars have emerged as the most cost-effective solutions to make the customer journey simpler and easier. Also, along with the targeted marketing approach, developers and real estate players have significantly doubled their reach to consumers, leveraging

a combination of tech-based solutions that have enabled transparency across the value chain. The technology influence in real estate has scaled up exponentially and it is this reason that developers and other stakeholders are collaborating on digital platforms to provide a seamless customer experience and enable faster decision-making.

⁶ IMAI with Nielsen (2019), United Nations and Housing Research

⁷ The Indian Readership Survey (IRS), Q1 2019

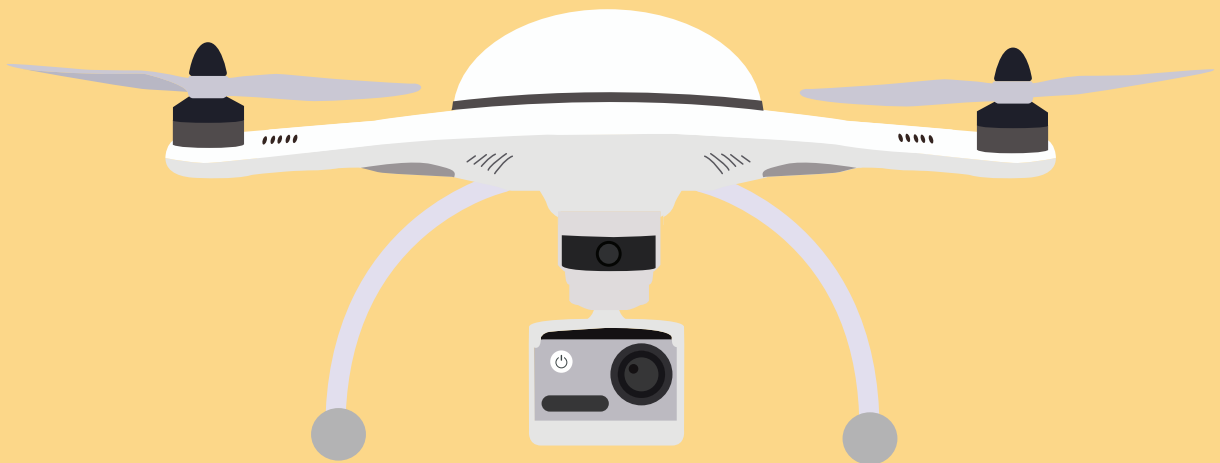
Both developers and consumers set to benefit from technologies under PropTech



DRONES

Unmanned aerial vehicles (UAV), colloquially known as drones, are used for several tasks such as data collection, mapping, surveillance, delivering objects, videography, photography and so on, with application across various sectors. In the real estate sector, drones offer a cost-effective solution for aerial photography and videography, enabling the developers and agents to market their property in a more attractive way. Apart from marketing, drones also aid in mapping, visualisation and early problem detection during construction stage, inducing efficiency in the process.

Although in a nascent stage, the use of drone technology in India has become more prominent post-2018 when commercial use of drones was allowed under the National Drone Policy (2018). The Indian drone industry and market is expected to be more than USD 800 million by 2021.⁸ With increased adoption of the technology in the real estate sector, companies manufacturing drones and providing support services in this sector have been able to attract nearly USD 13 million as private equity investment until now.⁹ Also, there has been a surge in the use of drones amongst developers during the current pandemic, since it provides an alternate solution to a physical site visit for home-bound buyers and helps in maintaining the social distancing norms.



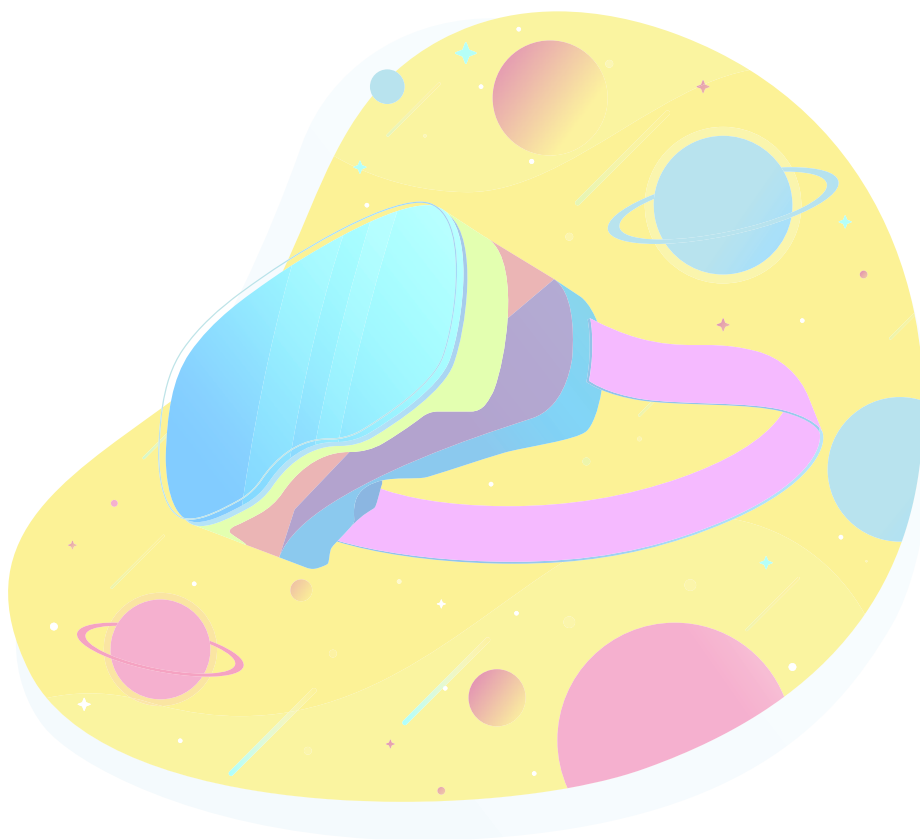
⁸Invest India

⁹Venture Intelligence, Housing Research

VIRTUAL REALITY

Currently, extensively being applied in sectors such as entertainment and retail, virtual reality (VR) technology aids in creating a simulated environment. In the real estate sector, VR acts as an excellent tool for displaying properties and its surrounding areas, enabling the developers to provide near-reality experience to potential buyers, where they can navigate and analyse the space on their own remotely. Also, along with VR, the use of AR adds a layer of realistic projections, thus creating a highly interactive experience for buyers.

VR technology has been gaining traction in the Indian real estate sector since the past few years, with startups attracting funding of more than USD 17 million since 2015.¹⁰ The on-going pandemic has further accelerated its adoption as more and more developers and agents started experimenting with VR technology to provide on-ground experience of the property to fence-sitting buyers during the lockdown. Also, as indicated by our survey elaborated further in the report, consumers find virtual tour beneficial in making home-buying decisions and closing the deal online. With benefits for both developers and buyers alike, this trend is here to stay.



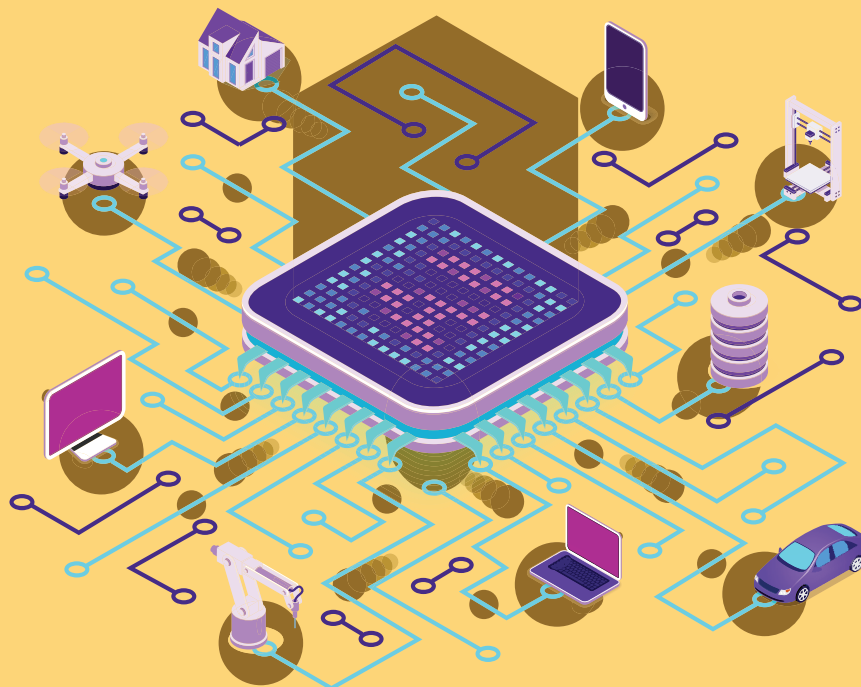
¹⁰ Venture Intelligence and Housing Research

INTERNET OF THINGS (IOT), BIG DATA AND ARTIFICIAL INTELLIGENCE (AI)

The combination of technologies such as big data, IoT and AI is already disrupting different sectors, aiding businesses in accessing a large volume of data and making informed decisions in real-time. While IoT aids in collecting extensive amounts of data through internet-connected devices, AI involves using big data through computer programmes and machines which learn, analyse, predict and self-correct. A combination of these technologies is already widely applied in the ecommerce sector, which uses it for augmenting customer experience by way of chatbots, personalised recommendations, targeted advertisement campaigns, and so much more.

In real estate, the application of big data coupled with AI can aid in taking a successful data-driven approach, which can yield powerful insights at a granular level. Real estate marketplace companies such as Zillow and Trulia in the US are already using big data and IoT along with AI for predicting property values, personalising buying and selling experiences and increasing consumer engagement.

IoT is also applied in home automation and property management, aiding in household chores, predicting maintenance, energy saving, and improved resident satisfaction. As smart homes and smart buildings garner the attention of consumers and, hence, that of the real estate developers, startups providing related services and products have already clocked USD 76 million in funding till date.¹¹



¹¹ Venture Intelligence and Housing Research

3D-PRINTING

Although a novelty, 3D printers are gaining attention in the construction industry since they offer a faster alternative to traditional construction methods. This technology, generally used on-site, involves using mobile building-sized printers with robotic arms, which inject material such as cement in a digitally marked framework to form the external and internal structure of the building.

3D printing is being used across countries and aids in improving safety, saves time and increase productivity. For instance, the Dubai government came up with 'Dubai 3D Printing Strategy' that aims to reduce labour by 70 percent, cost by 90 percent, and time by 80 percent in different sectors.¹² In the construction sector, 25 percent of Dubai's buildings are envisioned to be 3D printed by 2030. Being cost-effective and faster, 3D printers can be used for wider applications in sectors such as affordable housing, disaster management, and sustainable buildings in the near future.



¹² Dubai 3D Printing Strategy, UAE government

BLOCKCHAIN

Blockchain is an innovative technology that is disrupting the financial sector and is predicted to have a widespread effect on various sectors, including real estate. In simple terms, it is a digitised record-keeping technology, which enables tracking records and transactions in real-time across a network of computers.

Blockchain, in real estate, offers a new way for buyers and sellers to connect, create and authenticate contracts instantly, without the intervention of intermediaries. Another application includes creating immutable digital records of land titles, thus mitigating land management issues.

Also, cryptocurrency and tokenisation, a process of representing fractional ownership stake in real estate asset, are being enabled by blockchain technology, and aid in improving the efficiency of transactions and liquidity in the real estate sector by reducing time and helping investors in diversifying portfolios. Globally, in the real estate sector, there are 250+ startups providing solutions using blockchain technology, a majority of which are concentrated in countries with a robust digital infrastructure such as the US and European countries.¹³

In India, the technology is yet to scratch the surface since real estate transactions are still largely paper-based. However, with a conducive regulatory environment and a push for cashless economy, India's real estate transactions will go through a sea change with the application of blockchain technology.



¹³Blockchain Real Estate, Foundation for International Blockchain Real Estate Expertise, 2020

SOFTWARE AS A SERVICE (SAAS)

SaaS, which stands for software as a service, falls under the umbrella of cloud computing. This technology enables individuals and organisations to use software applications via the internet and access data remotely. Such applications are generally maintained by third-party service providers. With mobile access to up-to-date data and easy integration with the existing digital infrastructure, this technology has the ability to deliver benefits across industries. It aids in quick decision-making, while remote access to data improves the scalability of businesses.

SaaS technology can be applied in real estate at various stages and offers solutions for project management, sales and marketing, customer relationship management (CRM), cashless transactions, property management and so on, making these processes more efficient. SaaS also enables integration of different systems such as CRM, payment gateways and vast databases, ensuring data accuracy and minimising its duplication.

With technology becoming an integral part of businesses in various sectors in India, the revenue for SaaS companies has already reached USD 3.5 billion as of FY 2020.¹⁴ It has clocked 1.5 times faster growth rate compared to the global landscape. With SaaS industry poised to grow and real estate sector evolving digitally, application of this technology is bound to grow as well.



¹⁴NASSCOM

CHANGING CONSUMER PERSPECTIVE

As seen previously, the digital wave is sweeping across the value chain of the Indian real estate sector and is disrupting how homebuyers and sellers are interacting with each other.

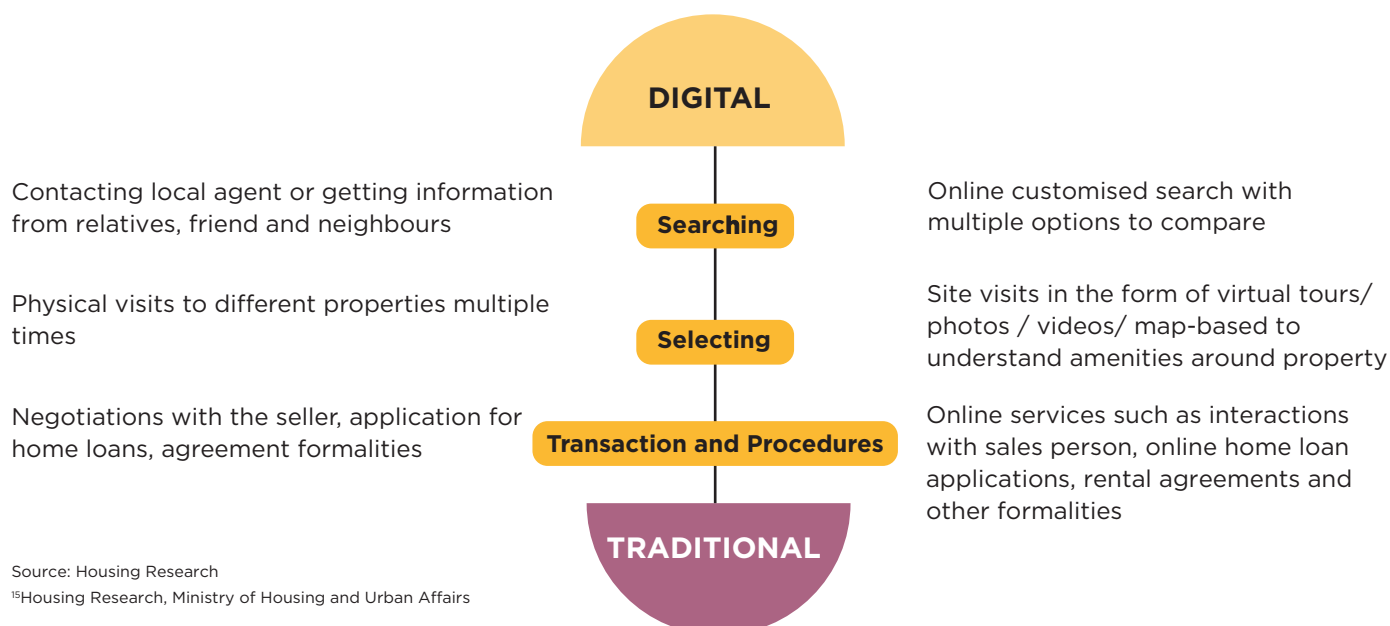
Many digital sales and marketing or business platforms offering a plethora of customised options for buying, renting and selling residential properties have surfaced in recent years as an alternative to the traditional method, which was mostly dependent on finding a local broker or interested sellers through personal acquaintances.

With such digital business platforms, consumers can instantly and remotely access information about the location, project specifications, and costs along with photos and videos of the property. Moreover, these platforms are further evolving into full-stack solutions by providing services for ancillary processes such as securing loans, registration, rent agreements and other transaction formalities.

However, since home buying is capital-intensive, the buyer wants to mitigate any risks associated with it, mostly because the Indian real estate sector is still evolving and lacks transparency. Various factors such as unclear land titles, lack of uniformity in local laws and procedures, defaulting developers, delayed projects, and the recent liquidity crisis, amongst others, have affected the consumer sentiments negatively over the past few years.

Although government initiatives such as the Real Estate (Regulation and Development) Act (2016) are steps in the right direction to instil consumer confidence, our analysis indicates that between 2017 and 2020, nearly 11.5 lakh units were sold, but in the same time period, approximately 44,000 brokers were registered under RERA, indicating that a majority of sales are still taking place through unregistered brokers and agents.¹⁵

Adding home to cart - Traditional vs digital



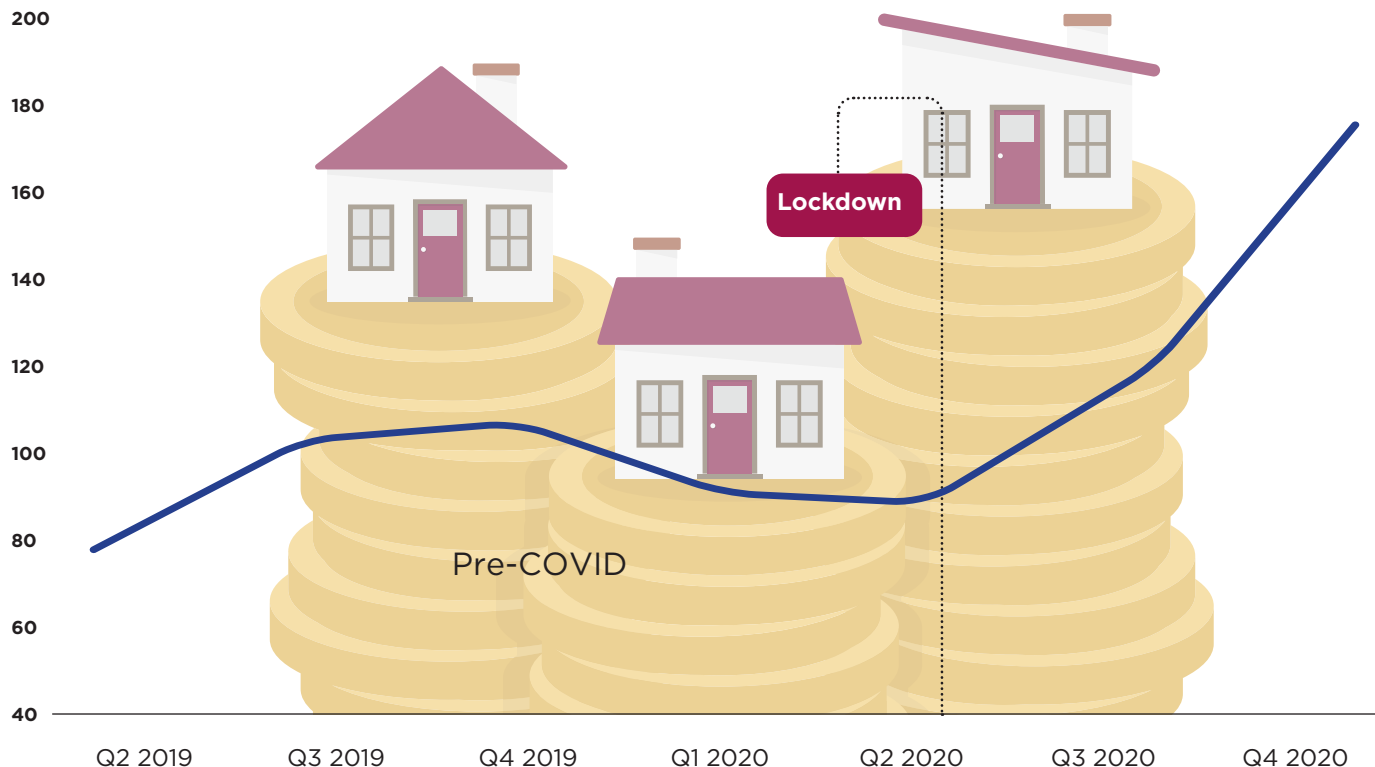
Having said that, however, in recent years, more and more consumers are exploring business platforms to buy/ rent residential spaces, as is also indicated by our Virtual Residential Index, which gauges online consumer interest for residential properties.

The index has been moving north especially post-lockdown, owing to pent-up demand, festive season and still-prevalent social distancing norms, which have encouraged buyers and renters to move towards digital platforms.

The Housing virtual residential demand index touched 166 in Q4 CY2020, compared to 123 in preceding quarter. With India's internet users set to reach 1 billion by 2025, this interest is only set to grow further.

Also, with various associated benefits for both buyers and sellers, the use of such platforms presents itself as an opportunity to bridge the current gap between buyers and sellers, making the process more transparent and efficient.

Home buyers / renters move towards digital platforms Virtual Residential Demand Index*



Source: Housing Research

* Virtual Residential Demand Index is a barometer to gauge online consumer interest for residential properties for buying and renting within a given period in the top eight cities. Base: Q1 2020 (Refer Annexure for methodology)

To further understand the consumer perspective in more detail, we conducted a survey by reaching out to potential home buyers/ renters and gauge their readiness for buying/renting homes using digital platforms. This survey was conducted online through stratified random sampling with respondents spread out across the top-eight cities of Ahmedabad, Bengaluru, Chennai, Delhi NCR, Hyderabad, Kolkata, Mumbai and Pune.

The insights represent the views of nearly thousand potential homebuyers. The findings indicate that although the process of buying or renting a home entirely through digital platforms is still at a nascent stage in India, there is growing interest among the consumers to explore such platforms more extensively.

IS INDIA READY TO BUY A HOME ONLINE?

37%

Homebuyers willing to
close deal virtually after
one site visit

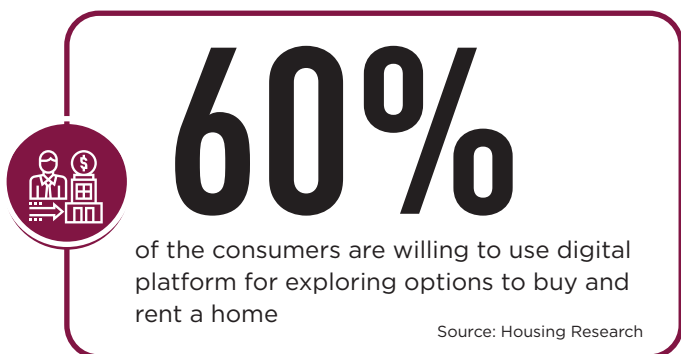
60%

Buyers willing to use digital
platform for exploring options
to buy or rent a home



**Developer's
credibility and
virtual tours
amongst top
drivers to close the
deal completely
online**

As the pandemic has given the market an impetus to explore online business platforms, our survey findings suggest that a majority (60 percent) of the respondents were willing to explore such platforms to both buy and rent a home.



Although the initial process of buying or renting a home may start online, 47 percent respondents were willing to close the deal after multiple site visits. **However, a significant 37 percent of respondents were willing to close the deal after one site visit or close it entirely online.**

This trend was more prominent in cities such as Mumbai and Chennai where nearly 50 percent respondents were open to buy/rent the home entirely online or after just one site visit as compared to other metro cities.

Also, it was observed that, overall, the respondents in the age group 25-35 years were more open to closing the deal completely online. Comparatively older respondents, especially with age beyond 45 years, were interested in using digital platforms to search for options but close the deal only after multiple site visits.

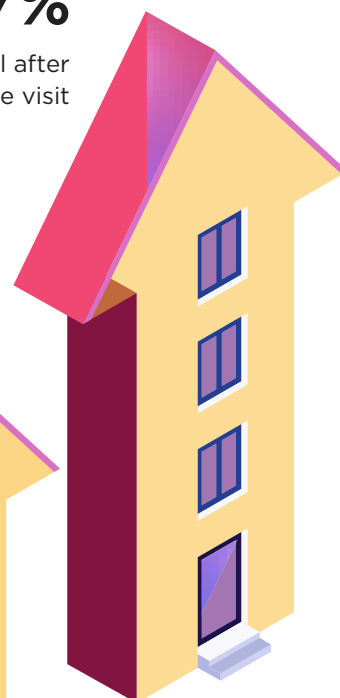
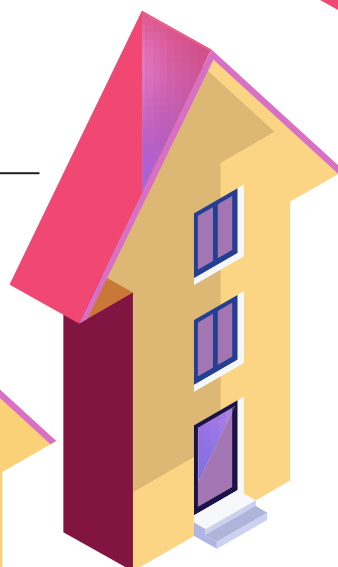
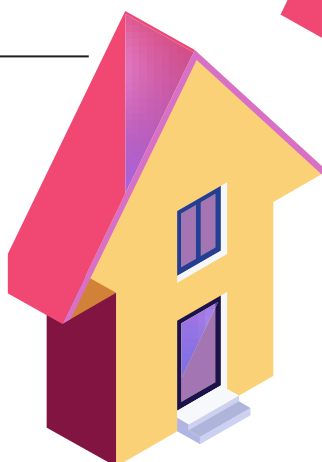
It indicates that although the process of buying or renting homes entirely online is still at a nascent stage, digital platforms have been able to garner the attention of the Indian consumer across ages, more so in the current scenario of COVID-19 pandemic.

Indeed, the pandemic has pushed more developers to use technologies such as virtual tours, webinars, drone site visits, and video conferences to simulate the physical experience of a property and attract the home-bound buyers.

Moving towards digital technology has also proved to be more productive for developers. While previously a salesperson had to organise site visits for each buyer and was able to conduct only one or two site visits a day, use of tools such as webinars and video conferences allow developers to accommodate multiple buyers at the same time. With the exacerbated need for safety and convenience, such tools would further aid the consumers in closing the entire deal online.

Consumer confidence in digital business platforms is growing

16%
Do not prefer
online platforms

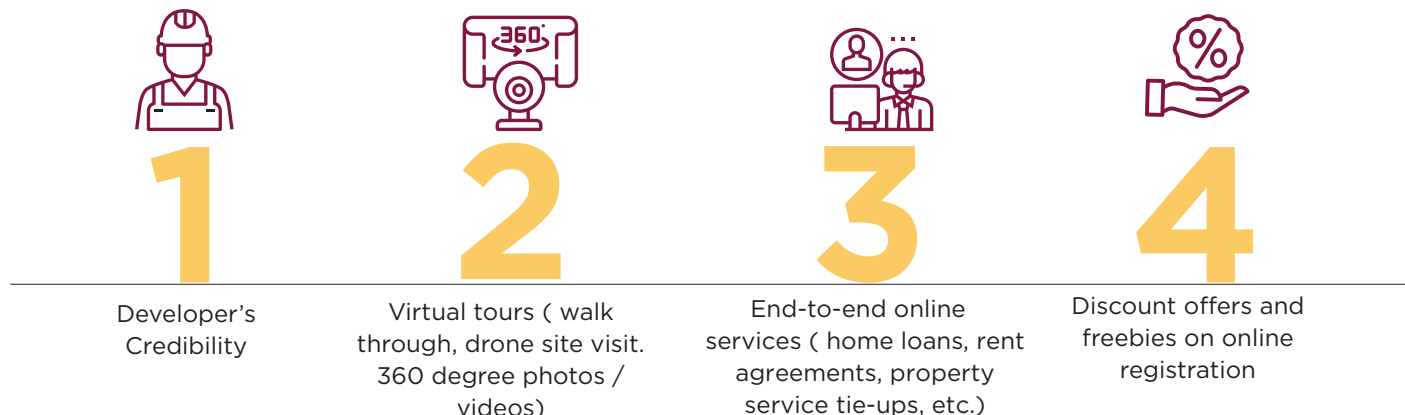


47%
Close the deal after
multiple site visit

37%
close the deal virtually
after one site visit

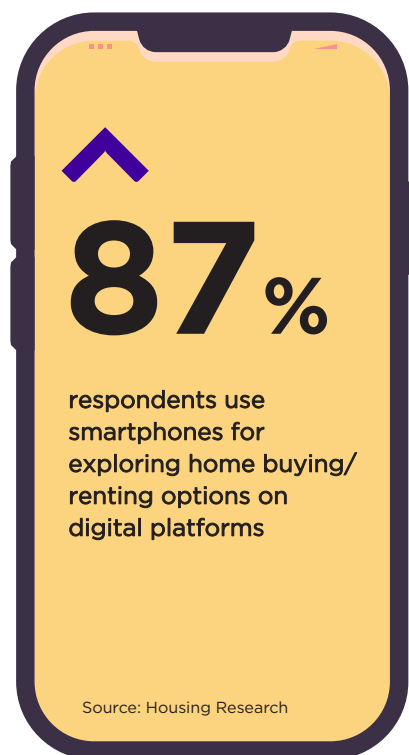
Source: Housing Research

Confidence in developer and virtual tours rank highest for online deal closure



*Ranking is based on number of respondents that have selected the option

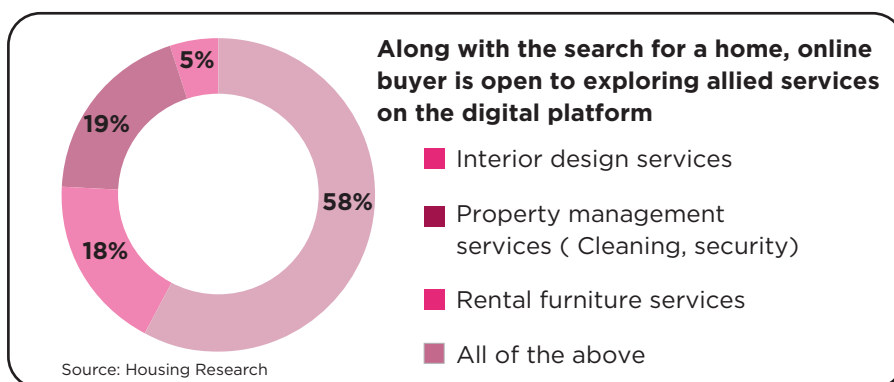
Source: Housing Research



In line with this, respondents opined that developer's credibility followed by virtual tours in the form of 3D walkthrough, drone site visits, photos and videos are the top driving factors for exploring digital platforms to buy/rent home and closing the deals completely online. This indicates that along with enhanced consumer experience, confidence in the project delivery and quality is vital for decision-making and closing the deal online.

While developers' credibility was ranked the highest across the top eight cities, it was a key factor in cities such as Delhi NCR, Kolkata, Pune, Ahmedabad and Chennai.

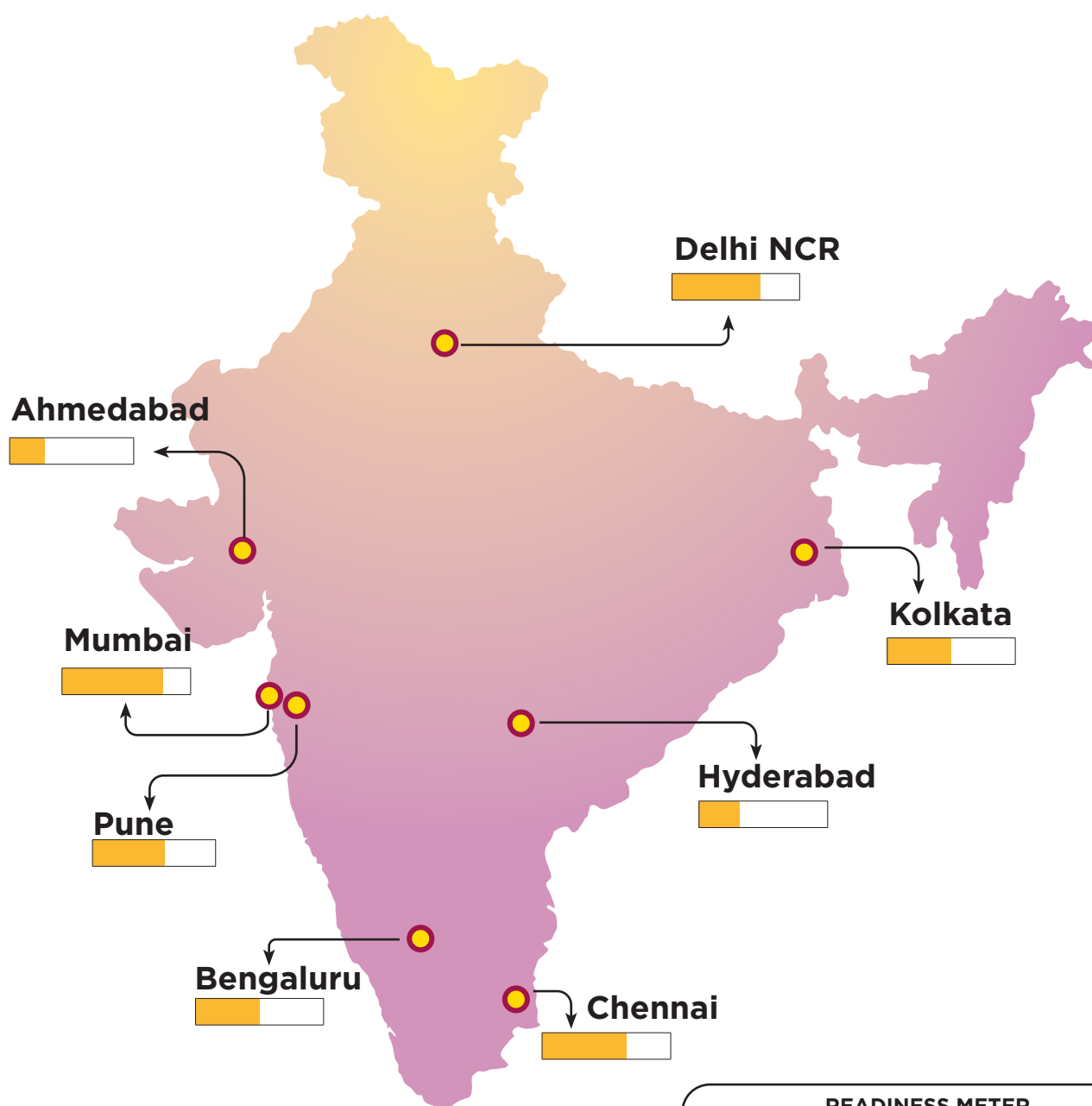
Whereas, virtual tours and end-to-end assistance were most preferred in case of Bengaluru and Hyderabad, respectively. Mumbai was seen to favour discounts and freebies equally to developers' credibility.



The survey also indicates that the consumers are not just bound to explore the home buying/ renting options through digital platforms but are interested in other residential services as well.

While 37 percent respondents were willing to close the deal online or after one site visit, nearly 58 percent were also ready to avail other residential services such as interior design services, property management services, and furniture rentals through digital platforms.

METROS PREPARED TO BUY A HOME ONLINE



*Score for readiness meter for each city is calculated through weights on number of respondents wanting to close the deal completely online or after one site visit, number of internet users and population in each city

Source: Census of India (2011), IAMA 2019, Housing Research

Overall, the survey findings highlight that there is growing interest as well as confidence amongst people to buy/ rent homes using online platforms. Moreover, the current pandemic has presented a unique opportunity that has further pushed the consumers as well as developers to increase and trust the use of digital platforms.

To corroborate this fact, the use of e-wallets received a significant push during the demonetisation¹⁴ drive

in 2016, resulting in digital payment platform such as Paytm seeing a 700 percent surge in traffic and 1,000 percent growth in transaction volumes in the following months.

Similarly, although it was unimaginable to buy or rent a home virtually even until a few years ago, the pandemic has acted as a positive catalyst to explore digital business platforms in more extensive ways.



¹⁴The Government of India announced the demonetisation in 2016, which removed high denomination banknotes from the economy

KEY INSIGHTS

- Globally PropTech investment clocked USD 33 billion in 2019 – a record year.
- Total private market investment in India stood at USD 55 billion across 788 deals in 2020, compared to USD 50 billion in 2019.
- Sectors such as IT products and services, banking and financial services (BFSI), retail, real estate, and telecom services rank highest on Housing.com's Digital Investment Score for sector attractiveness for investments in the digital space.
- With a total investment of USD 2.4 billion, PropTech investments have grown by CAGR of 57 percent (2010-2020), compared to a 10 percent growth in investments received in the overall real estate sector.
- Despite the economic uncertainty amid the global pandemic, private market investment in PropTech in India clocked USD 551 million in 2020 – the highest ever, compared to USD 549 million in 2019.
- Shared economy and sales and marketing or online business platforms were the most preferred segments for investments by the private market, with a 48 percent and 18 percent share, respectively, from the overall investment of USD 2.1 billion between 2015 – 2020.
- The average deal size for investments in online business platform grew from USD 4 million in 2015, to USD 70 million in 2020. Deal size in the shared economy increased from USD 7 million to USD 33 million during the same period.
- Virtual Residential Demand Index touched 166 in CY Q4 2020 compared to 123 in the preceding quarter.
- Of the total, 37 percent of potential homebuyers are ready to buy a home completely online or close the deal after just one site visit. Nearly 47 percent buyers are willing to close the deal after multiple site visits.
- Homebuyers in Mumbai are most ready to buy a home online, compared to other major cities. Discounts and freebies, along with the developer's credibility were prime factors for online deal closure for Mumbai.
- Developer's credibility was the key driving factor for closing the deal online in cities such as Ahmedabad, Chennai, Delhi NCR, Kolkata, and Pune. Virtual tours and end-to-end assistance were preferred factors in Bengaluru and Hyderabad.

Annexure

Digital Investment Score Methodology

Digital Investment Score is calculated through weights on number of deals, total investment and investment in the digital space in the particular sector.

To normalise the values, investment deals and investments in tech-based companies have been assigned a rank between 1 and 5 (1 being the lowest) as per the median value for each of these three parameters. To calculate the Digital Investment Score, the above three parameters have been assigned weights as per the table below. The score for each sector is the weighted average of ranks and weights assigned to each of the three parameters.

Parameter	Weight
Total investment	25%
Number of deals	25%
Investments in tech-based companies	50%

Virtual Residential Demand Index Methodology

Virtual Residential Demand Index is a barometer to gauge online consumer interest for residential properties for buying and renting within a given period in the top eight cities such as Ahmedabad, Bengaluru, Chennai, Delhi NCR, Hyderabad, Kolkata, Mumbai and Pune. It is calculated based on quarterly rolling average weighted against the actual consumer interest received multiple times across our platforms. Base: Q1 2020

Real Estate (Regulation and Development) Act or RERA – 2016

The Real Estate (Regulation and Development) Act or RERA was introduced in 2016 by the Government of India, with an objective to protect the rights and interests of the consumers and to promote standardised practices, good governance, and fair transactions to bring in transparency and accountability in the real estate sector.

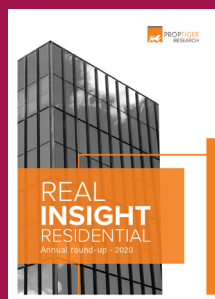
The state governments are to establish regulatory authorities under the Act, which will register and maintain a database of real estate projects, and which will be available for public information through an online platform. The Act protects the buyer's as well as the developer's interest and improves the investor's confidence through provisions such as establishment of appellate tribunals for speedy redressal of consumer complaints, maintaining of escrow account by developers and penalty for defaulting buyers and sellers.

HOUSING RESEARCH

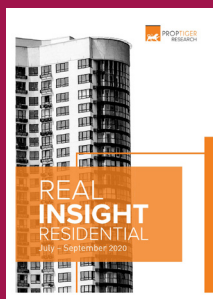
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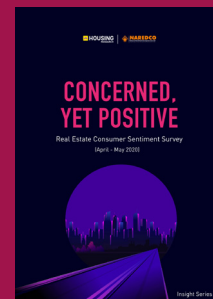
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