



Clicks and Mortar: The Growing Influence of Proptech



Foreword

Technology has transformed many aspects of our lives – from how we communicate with each other, to how we buy things, to the way we work. At JLL, a leading professional services firm that specialises in real estate and investment management, we know it won't be long before it transforms the real estate world. Data analytics, artificial intelligence, the Internet of Things, virtual reality, blockchain – all of these will have significant repercussions for how we invest in and occupy real estate in the future. Already at JLL, we're integrating some of these technologies into the services we provide to our clients.

So in this exciting new world where technology and real estate converge, which companies will be at the leading edge? Will it be the big, established players, or the entrepreneurial new entrants? Or do both have a role to play as 'proptech' transforms the industry?

With more and more processes being digitalised, many established sectors have experienced disruption at the hands of new technology platforms. That's why it's vital that real estate advisors, brokers, investors and start-ups recognise the changes and opportunities ahead.

To understand what's driving the shift, we collaborated with Tech in Asia, a platform with its finger on the pulse of the tech start-up scene. We asked them to quantify the size, quality and characteristics of the proptech opportunity in Asia Pacific. While this burgeoning new sector is more established in Europe and North America, we believe much of the innovation and adoption in proptech will come from this region. With its young population, rapid urbanisation and 'mobile first' mindset, it's set to have a huge impact in Asia Pacific.

With this in mind, I'm delighted to share with you Clicks and Mortar: The Growing Influence of Proptech. In this report, the first of its kind in this region, we look at the range of start-ups in the proptech eco-system, the investment they're attracting, and key client needs and markets they serve. Most importantly, we dig into what impact these companies, and the products and services they offer, will have on the real estate end-user – whether you're an institutional investor, a corporate occupier, or a first-time buyer.

As a company, JLL has been serving clients for more than 200 years. Many of the companies we looked at for this report have been in existence less than two. But what we have in common is that we must all innovate and evolve to stay relevant – and to stay in business.

I firmly believe the next five years are pivotal for the real estate industry. We must embrace change or be left behind. Drop me a line at Anthony.Couse@ap.jll.com and let me know if you agree.

Anthony Couse

Chief Executive Officer
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Executive summary

JLL predicts that the total value of investable global commercial real estate will reach US\$65 trillion by 2020, with Asia Pacific accounting for over 30%¹. Considering the number of emerging markets in the region and their accelerating urbanisation rates, the region will play an increasingly important role in the global real estate landscape.

This is a sector that has been underserved by start-ups, but not for long. Property technology – or proptech - start-ups have begun entering a space traditionally dominated by large incumbents. Asia Pacific has seen its own share of proptech start-ups emerging. Our research shows that they have received around 60% of over US\$7.8 billion invested in proptech start-ups worldwide since 2013².

Significantly, the market dynamics of the Asia Pacific property market have caused proptech in Asia Pacific to evolve differently from proptech in North America and Europe. Property listing start-ups have the lion's share of funding, driving rapid expansion into adjacent verticals such as big data and analytics. Meanwhile, compared with North America and Europe, Asia Pacific's diverse demographics and differing levels of infrastructure and development present challenges such as the lower availability of tech talent and consumer preferences for offline channels and tools.

Nonetheless, such difficulties should be alleviated soon given the growing smartphone penetration in Asia Pacific and rising salaries in the technology sector, which will attract an influx of talent from traditional industries. Other strong drivers of change like rapid urbanisation and government support for Smart Cities are likely to boost the development of proptech as well as corporate engagement and collaboration in this space.

There are plenty of opportunities to be first-movers in the underserved niches of proptech. Consumers, start-ups and corporates will all stand to benefit being part of the sector's growth in Asia Pacific.

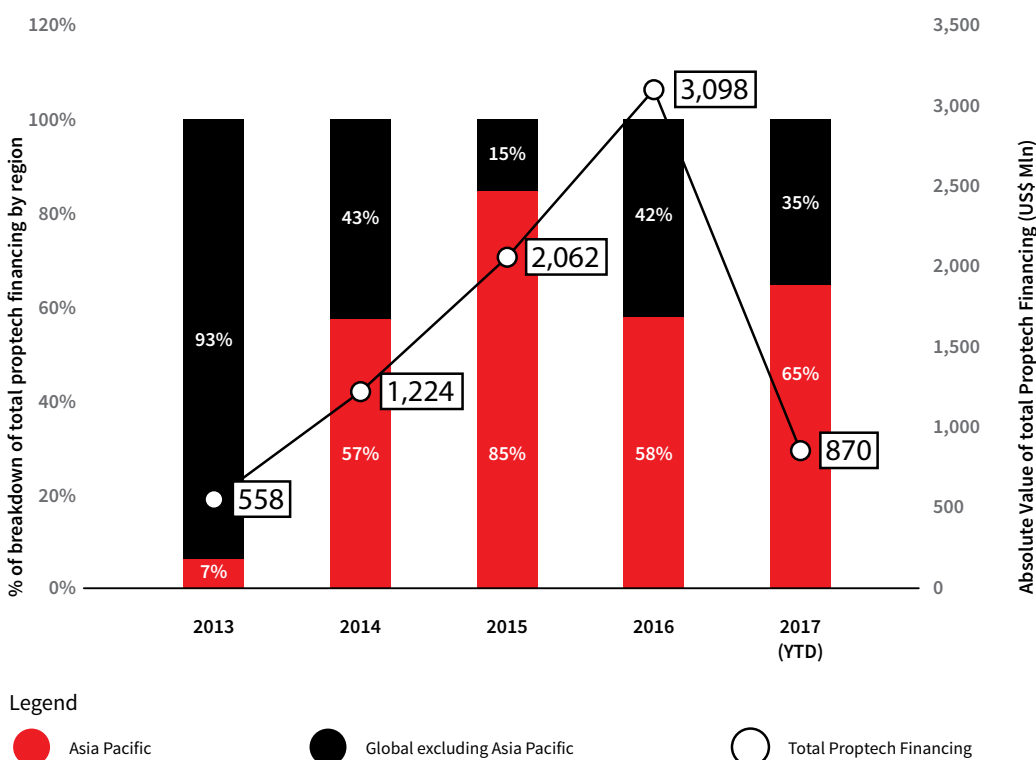
1. Global Real Estate Universe 2017, JLL, April 2017
2. State of Real Estate Tech, CB Insight, 2017. Source: <https://www.cbinsights.com/research/briefing/real-estate-trends/>

What is proptech?

Proptech, a blend of the words property and technology, refers to the utilisation of technology as a solution to challenges in the real estate sector. Specifically, technology is used to create or renovate services offered in real estate to buy, sell, rent, develop, market and manage property in a more efficient and effective way.

Given the total value of investable global commercial real estate will reach US\$65 trillion by 2020³, this presents too large an opportunity to escape the attention of start-ups.

Proptech Financing by regions



Graph 1: Proptech Financing by Regions

179 proptech start-ups in Asia Pacific have raised funding since 2013, accounting for almost US\$4.8 billion of the US\$7.8 billion⁴ that has been invested globally since 2013. These flows can only increase to match the growing demand for property in Asia Pacific.

While the bulk of inflows have gone to Chinese start-ups that are focused on mainland China's roughly US\$ 6.6 trillion⁵ total investable commercial real estate universe, investments into other markets, namely, India, Southeast Asia, Australia and Northeast Asia, have begun picking up. In addition, start-ups have progressed in their technological capabilities, going beyond online portals to incorporate emerging technologies such as Bitcoin into their services.

Considering the high-risk and disruptive nature of start-ups, only those that have raised funding will be mentioned in this report, as venture capital funding typically indicates start-up viability and maturity.

In the following sections we will help you make sense of it.

3. Global Real Estate Universe 2017, JLL, April 2017

4. State of Real Estate Tech, CB Insight, 2017. Source: <https://www.cbinsights.com/research/briefing/real-estate-trends/>

5. Global Real Estate Universe 2017, JLL, April 2017

Waves of change – proptech trends

Proptech in Asia Pacific can be broken down into three waves. It began with proptech 1.0 in 2007 when start-ups like PropertyGuru were launched to address consumers’ need for a single online portal that collated property listings. These portals took the form of aggregators or marketplaces, and presented a relatively low degree of technical challenge with a direct-to-consumer or pay-to-list business model.

Proptech 2.0 emerged in 2013 to address the needs of small businesses and brokers that were more complex than those of consumers. Start-ups like Propstack, a Commercial Property Intelligence platform based in India, provided tools that improved decision-making and business processes. The growing availability of tech talent enabled start-ups to employ more advanced technology such as Data and Analytics or Virtual Reality (VR), while using a pay-to-use or Software as a Service (SaaS) business model.

The current Proptech 3.0 wave – arising shortly after Proptech 2.0 in 2014 – is led by start-ups employing emergent technology such as Unmanned Aerial Vehicle (UAV) and solar power to address enterprise needs. These products such as QwikSpec’s cloud-based platform for field inspections and data analytics, require heavy upfront investment and domain knowledge in the property sector. It is worth noting that such innovations are built from the ground up to address complex enterprise needs instead of being adapted from products of other sectors.

Proptech 1.0

- Low technical challenge
- Consumer focus
- Aggregators / marketplaces



Proptech 2.0

- Medium technical challenge
- Small business focus
- Existing technology



Proptech 3.0

- High technical challenge
- Enterprise focus
- Emerging technology



Table 1: Evolution of Proptech in Asia Pacific

In the coming years, we anticipate the following trends;

1. Rapid expansion in proptech 1.0

Drivers: Middle class income growth, increasing smartphone penetration

Challenges: Business preference for offline channels

Growth in the middle class population and their income will create more demand for homes. Coupled with increasing smartphone adoption rates, the Internet will serve as the start of property searches for more home buyers. In addition, network effects readily lend themselves to list-and-search start-ups where an increased number of listings will make them more attractive to consumers.

As a subset of proptech 1.0, we see the potential for tech-enabled brokerages to grow immensely. This is due to the fact that developers and other incumbents need a means of digitising their inventory to keep up with evolving consumer preferences. Additionally, such start-ups will have added traction in markets with traditionally lower levels of institutional trust and professional services. By owning the full customer experience as well as guaranteeing quality listings and matching buyers and tenants with inventory, these start-ups have the potential to dominate the market.

On the other hand, they may continue to face an uphill battle in convincing brokers and developers to divert marketing spend from offline channels to online listings. This challenge could be overcome by the increasing numbers of younger, upwardly mobile buyers and tenants who turn to the Internet, compelling the diversion of ad spend into online channels.

2. Consolidation and competition within proptech 2.0

Drivers: Growing pressure for competitive edge within Proptech 1.0

Challenges: Competition from incumbents

As proptech 1.0 start-ups expand rapidly, they will increasingly come to compete for listings and views. To increase the attractiveness of their platforms, they will begin to offer additional value-added services such as property intelligence (Data and Analytics) and virtual viewing (VR and 3D). The lack of reliable data sources in Asian emerging markets boosts the data flywheel of proptech 1.0 start-ups who have access to large pools of proprietary data.

It may be more cost effective for Proptech 1.0 start-ups to acquire proptech 2.0 start-ups than building their own services. The high levels of funding that we have seen in the proptech 1.0 space means these start-ups possess the financial muscle to acquire instead of building out their own capabilities.

Proptech 2.0 start-ups in the underserved commercial property sector will face increased competition from incumbents, in addition to proptech newcomers who find the residential property space overcrowded. We may also see an increase in the number of proptech start-ups offering fringe technology meant for consumers such as smart home devices and solar panels.

3. Emergence of new verticals in Proptech 3.0

Drivers: Growing pool of technical talent, increased enterprise needs

Challenges: Need for property domain knowledge

With the continued growth of the property sector, property developers and brokers will face a corresponding increase in demand for their services. This is a growing niche that start-ups can serve and benefit from. The rising importance of technology in all aspects of life has encouraged the growth of technical sophistication within the region and attracted global tech talents to Asia Pacific.

This sets the stage for technically advanced start-ups catering to enterprise needs to grow rapidly. This is an underserved niche in Asia Pacific compared to countries such as the U.S., where a start-up called PlanGrid, which developed a construction blueprint app, raised US\$40 million in Series B funding and claimed to have helped over 500,000 projects around the world⁶. The spillover effects from said property boom in Asia Pacific should prove sufficient in convincing proptech start-ups to explore this space.

Increasingly complex enterprise needs pave the way for disruptive technologies, notably blockchain. Blockchain is probably one of the most popular buzzwords in recent years. In short, this new technology can be understood as “peer-to-peer” sharing of data⁷; that would help transform more than 30 industries⁸. However, beyond Bitcoin payments and remittance, blockchain remains largely experimental. In real estate, the adoption of blockchain would rewrite the industry in four ways: disintermediation, fraud prevention, Money 2.0 (a novel currency concept designed to empower anyone — not only central banks — to issue money), and smart contracts⁹. With blockchain, a database is stored in blocks that are chained to each other using a cryptographic signature, which allows blockchain to act as a middleman and eliminate intermediaries. Blockchain also offers an incorruptible ledger system that is unhackable due to its distributed nature¹⁰.

Bitcoin is widely known as a digital currency and, similar to Ethereum, it can perform “smart contracts”, minimising human involvement in agreement verification. With blockchain, the ways of doing business in real estate would be significantly altered.

In Asia Pacific, the number of blockchain start-ups is expected to surge with increasing funding from initial coin offerings, different venture capital funds, and established banks¹¹. Blockchain start-ups mostly operate in the fintech industry, with China and India being the two leading destinations of funding (US\$2 billion and US\$1.7 billion respectively, 2016)¹¹. Japan is another leader in blockchain – the country legalised Bitcoin and is rising as Bitcoin market leader¹². Within the proptech landscape, we have observed a number of Singaporean start-ups adopting blockchain to “tokenise” property.

Proptech 3.0 start-ups, however, will face significant challenges in hiring experts with the required domain expertise. A key reason would be remuneration – there is a significant disparity to overcome to draw technical specialists away from conventional firms. For example, in Singapore, the median salary of a Construction Project Manager is S\$84,184 per annum¹³ whereas start-up founders can usually expect a starting income of S\$24,000 to \$60,000¹⁴, which indicates that of the same level, personnel at start-ups cannot expect to earn the same rate as their peers who work at more established firms.

6. PlanGrid | Construction Software, Plangrid.com, 2017. Source: <https://www.plangrid.com/gb/>
7. How developing Asia is using blockchain pilots, The Diplomat, DiCaprio, A. & Beck, S., 2017. Source: <https://thediplomat.com/2017/08/how-developing-asia-is-using-blockchain-pilots/>
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13. Project Manager, Construction Salary (Singapore), Payscale.com, n.d. Source: http://www.payscale.com/research/SG/Job=Project_Manager%2c_Construction/Salary
14. How much should founders be paid?, TechnAsia, Ashenurst, L., 2016. Source: <https://www.techinasia.com/talk/how-much-founders-be-paid>

Viewpoint: The revolution will be digitised



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Of all the new property-related technologies under development, blockchain is perhaps the most revolutionary. It has the potential to radically change the securitisation of commercial real estate, improving liquidity as well as access to investment markets for both institutional and retail investors.

Blockchain technology offers a means to improve transparency. For real estate to compete effectively as an asset class, investors are demanding, and expecting, ever-greater levels of transparency – in terms of legal and regulatory enforcement as well as speedy and secure transaction processes.

The costs associated with trading real estate are much higher than in other asset classes, often resulting in a wide bid-ask spread – the difference between buyer and seller pricing expectations. Furthermore, transactions are often carried out via time consuming face-to-face interactions with various parties typically involved in the transaction process, e.g. lawyers, bankers and brokers.

Smart contracts, essentially programmes coded in the blockchain, have the potential to change this. When conditions specified in an encoded contract are met, the transfer of money or assets between parties is automatically triggered, reducing the costs and friction associated with these transactions. Smart contracts also offer a means to streamline commercial real estate investment through a new form of securitisation.

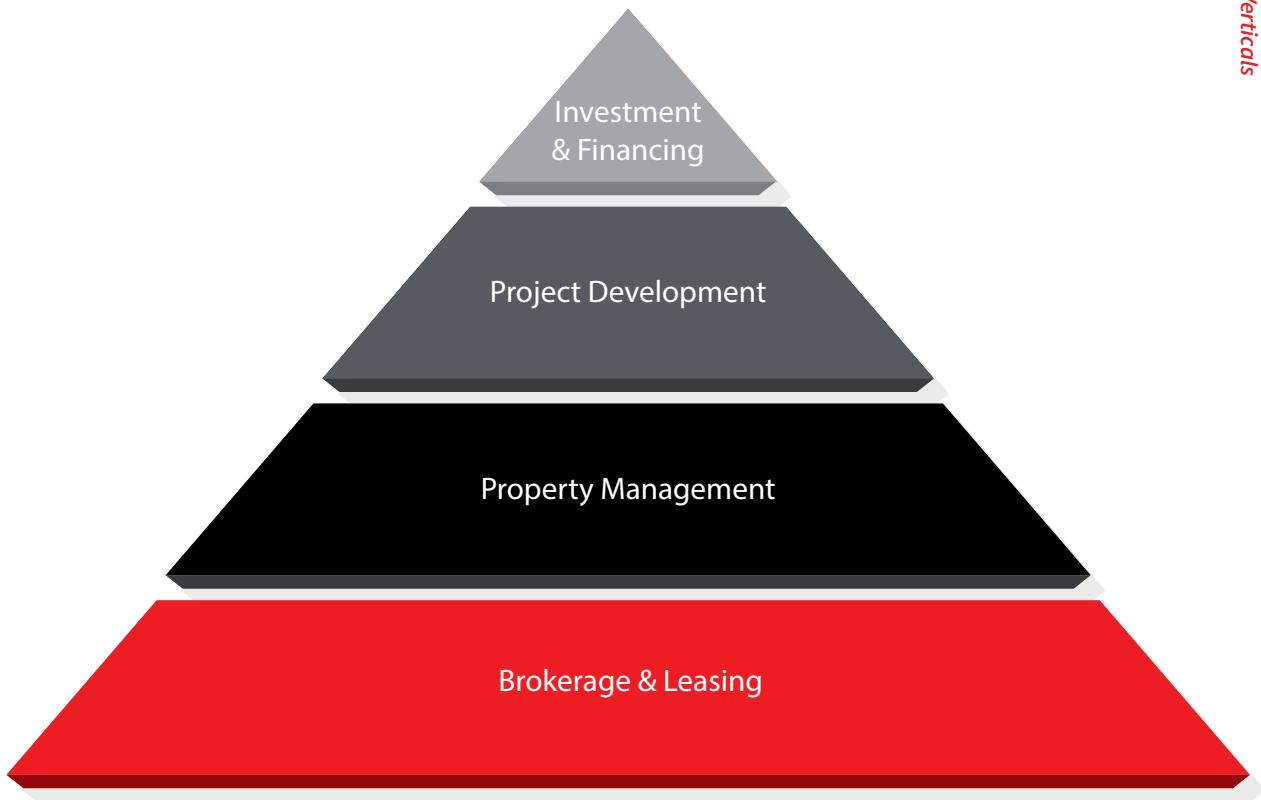
At the most basic level, real estate investors are purchasing an income stream. But real estate, including commercial real estate, is a highly illiquid asset class, making it difficult for investors to acquire and dispose of those income streams. The sale of a building can be facilitated by “tokenising” it, i.e. dividing up the ownership of the asset into multiple shares, each of which can be sold to a different investor. Smart contracts can enable investors to buy and sell shares of a building with rental income paid out to token holders. All other things being equal, the resulting improvement in liquidity would provide sellers and buyers with more information on asset pricing, narrowing bid-ask spreads.

Such a system would offer institutional investors a means to more quickly and accurately achieve their target allocations, and it would also enable them to easily dispose of assets. Barriers to commercial real estate investment could also be reduced, allowing for greater participation among retail investors.

However, this new approach to securitising real estate assets raises a number of questions. Where will tokens be traded? Will tokenised assets have the same level of governance as REITs (Real Estate Investment Trusts)? What effect will tokenisation have on asset management, quality and performance? Can third-party management help solve the quality and performance problems? And how will tokenised assets be valued?

While blockchain has the potential to transform commercial real estate, the change will not happen overnight. The development of supporting infrastructure will take time to develop. But work is already underway with private sector and government partnerships utilising the technology in places such as Sweden, Georgia, the United Kingdom, and Japan. It's only a matter of time before this new technology revolutionises commercial real estate investment.

Proptech Verticals



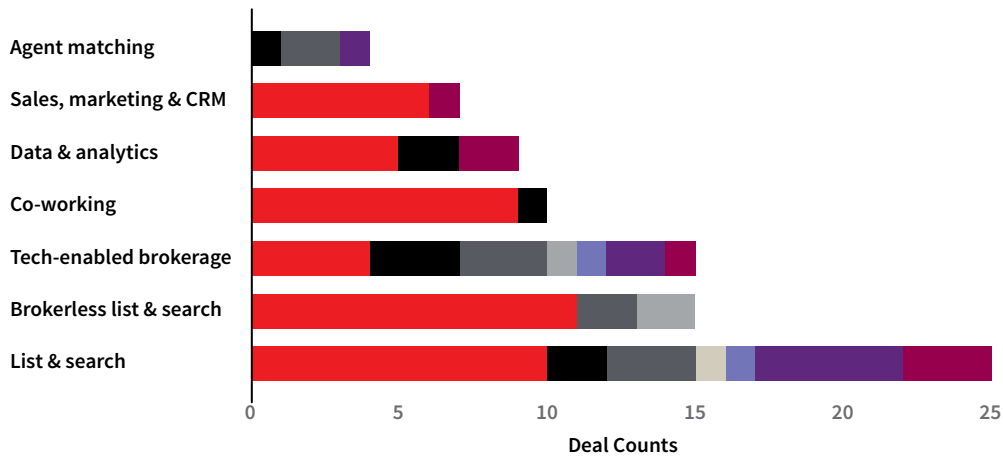
Based on different types of activities within the real estate market, we grouped Asia Pacific proptech start-ups into four main verticals: Brokerage and Leasing, Investment and Financing, Project Development and Property Management. In this region, start-ups operating in Brokerage and Leasing occupy the largest share, followed by Property Management, Project Development and finally, Investment and Financing. Within each vertical, start-ups will be categorised into sub-verticals based on either product functions or employed technologies.

Brokerage and Leasing

Out of the 179 proptech start-ups in Asia Pacific that have raised funding since 2013, 94 of them are in the brokerage and rental space where they serve as the channel or marketplace between brokers, property owners and purchasers. These marketplaces are primarily focused on residential property presumably in response to the regional buoyant housing market.

These marketplaces are the most mature among the verticals, receiving the most late-stage funding, and we are beginning to see the emergence of verticals that support the brokerage and rental process, namely in sales, marketing and Customer Relationship Management (CRM) tools for brokers, as well as co-working operators.

Brokerage & Leasing - Funding status



Legend



Graph 2: Financing status in Brokerage and Leasing vertical by sub-verticals

List and search

List and search portals, such as PropertyGuru of Singapore, are the most common types of start-ups. They are effectively an online classifieds platform combining search engines with brokers' listings. To commoditise and standardise the offerings, some start-ups like China's Mofang are going the extra mile to own and design the apartments being offered.



Tech-enabled brokerage

Eschewing the use of offline channels, tech-enabled brokerages use online platforms to connect their brokers with clients via internet platforms. Some tech-enabled brokerages like PropTiger even allow property developers to sell new inventory directly to home buyers. They also provide sales, marketing, and CRM tools to brokers.



Brokerless list and search

Taking a leaf out of Airbnb's book, brokerless list and search start-ups seek to connect property owners with buyers or tenants, thus replacing the broker as the intermediary of choice.



Agent matching

Agent-matching platforms use a combination of user social data and agent reviews to match home buyers with the agents that suit them best.



Co-working

Taking advantage of the growing number of start-ups and high rental costs, co-working start-ups are disrupting the property cycle by offering shared spaces, facilities and add-on supporting services to other start-ups, freelancers and increasingly more established companies. Compared with start-ups in other verticals, co-working start-ups do not possess unique tech capabilities; however as they use technology to meet users' real estate demands – namely the need for affordable workplaces for individuals or small groups of people – co-working start-ups can still be considered proptech. Co-working start-ups offer easy access to space and flexibility with IT support for tenants such as a mobile app for booking or events registration. To attract tenants, most co-working operators market themselves as communities that bring together start-ups and potential clients or investors.



Data and analytics

Initially beginning as a service that provided property buyers with the latest information and accurate valuations, data and analytics start-ups have begun providing enterprise clients with independent property data and reports.



Sales, marketing and CRM

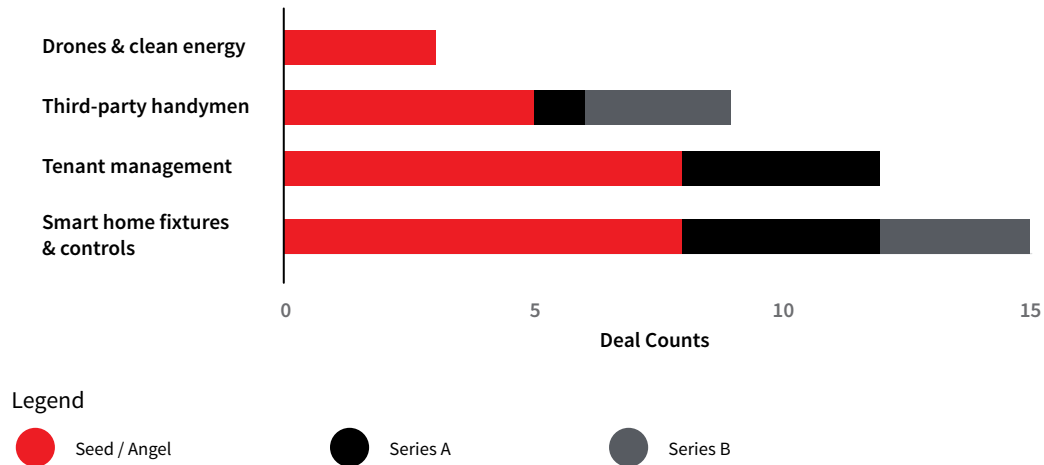
Start-ups that provide marketing, lead generation, CRM and networking tools to property professionals.



Property Management

Start-ups in the property management space provide the tools for property managers to carry out their tasks more efficiently and expand the scope of their work.

Property management - financing status



Graph 3: Financing status of Property Management vertical by sub-verticals

Drones and solar energy

Thanks to their added value for both real estate developers, agents and tenants, the use of drones and solar energy in the industry is getting increasingly popular. Drones provide the means for both marketing properties and remotely conducting building inspections while solar energy has evolved beyond merely powering homes to become a source of income through the sale of surplus energy.



Tenant management

The advent of cloud computing and Internet of Things (IoT) devices has enabled lease management start-ups to keep up-to-date records of tenants, maintenance tickets and space utilisation. In addition, lease management software is now available to help asset managers find and track tenants for their properties.



Smart home fixtures and controls

Tapping into the prevalence of WiFi, smart devices are part of the Internet of Things universe and are used to connect and control disparate parts of the property.



Third-party handymen

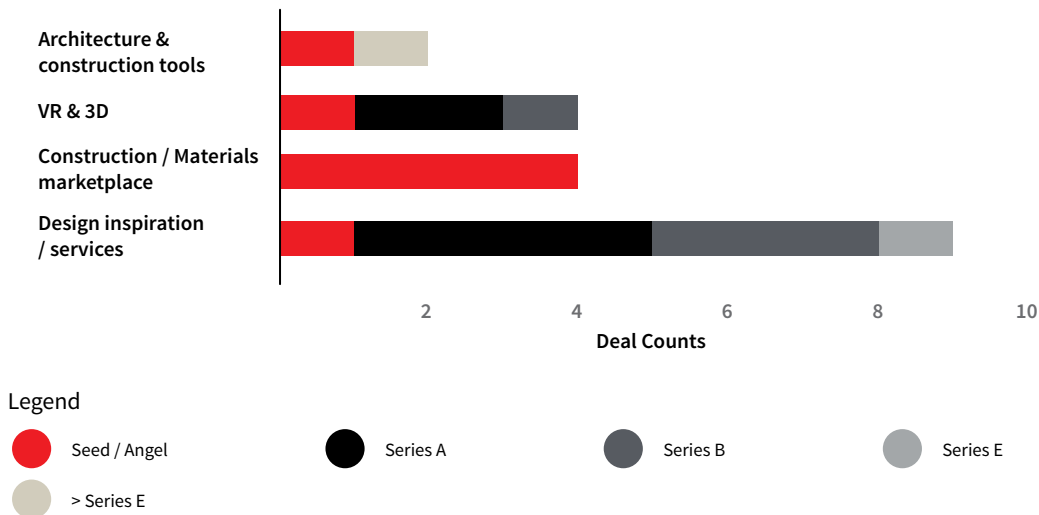
An avenue for property managers and homeowners alike to find reputable handymen for property maintenance.



Project Development

Project development is a space that traditionally has high barriers to entry as it requires intensive capital expenditure and in-depth industry knowledge. Start-ups here reflect these structural considerations as they are largely consumer-focused. This allows them to use readily and cheaply available technologies like virtual reality (VR) or a marketplace, instead of acquiring the expertise and building innovations from scratch which would be required if they were catering to enterprise solutions.

Project development - financing status



Graph 4: Financing status of Project Development vertical by sub-verticals

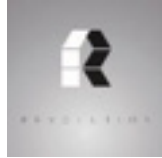
Architecture and construction tools

Focused on removing pain points during the design and construction stages, start-ups in this vertical use cloud technology to digitise records and build a touchstone for architects and engineers.



Construction/Materials marketplace

Like list and search start-ups, this vertical brings together contractors and suppliers to potential customers. For example, Revolution Precrafted strengthens this approach by using advanced modular tech and robotics to create homes within 90 days of a designer being chosen by the customer.



Design inspiration/services

See it, like it, buy it. Unlike Pinterest where users post designs that inspire others, most design inspiration/services start-ups use design inspiration as a means of compelling customers to buy their products. More of these start-ups allow customers to upload their floorplans and receive customised design plans.



VR and 3D

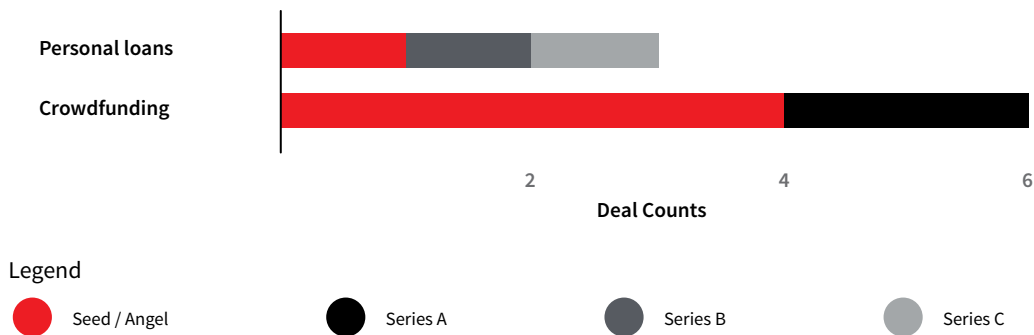
Intended for architects, brokers and buyers alike to better visualise a property, VR and 3D are technologies used to provide a hassle-free viewing experience and reduce design mistakes.



Investment and Financing

The investment and financing space is in its budding stages and focuses on providing fresh options to retail property investors and buyers. These options take two forms – crowdfunding and fintech. Existing fintech start-ups in the personal loans market such as WeLend now readily provide personal loans that can be used for rent and mortgage payments.

Investment & Financing - financing status



Graph 5: Financing status of Investment & Financing vertical by sub-verticals

Crowdfunding

Like Kickstarter for property developments, these platforms present would-be investors with lower barriers to entry due to the smaller amounts accepted, while enabling property developers an alternative means of fundraising.



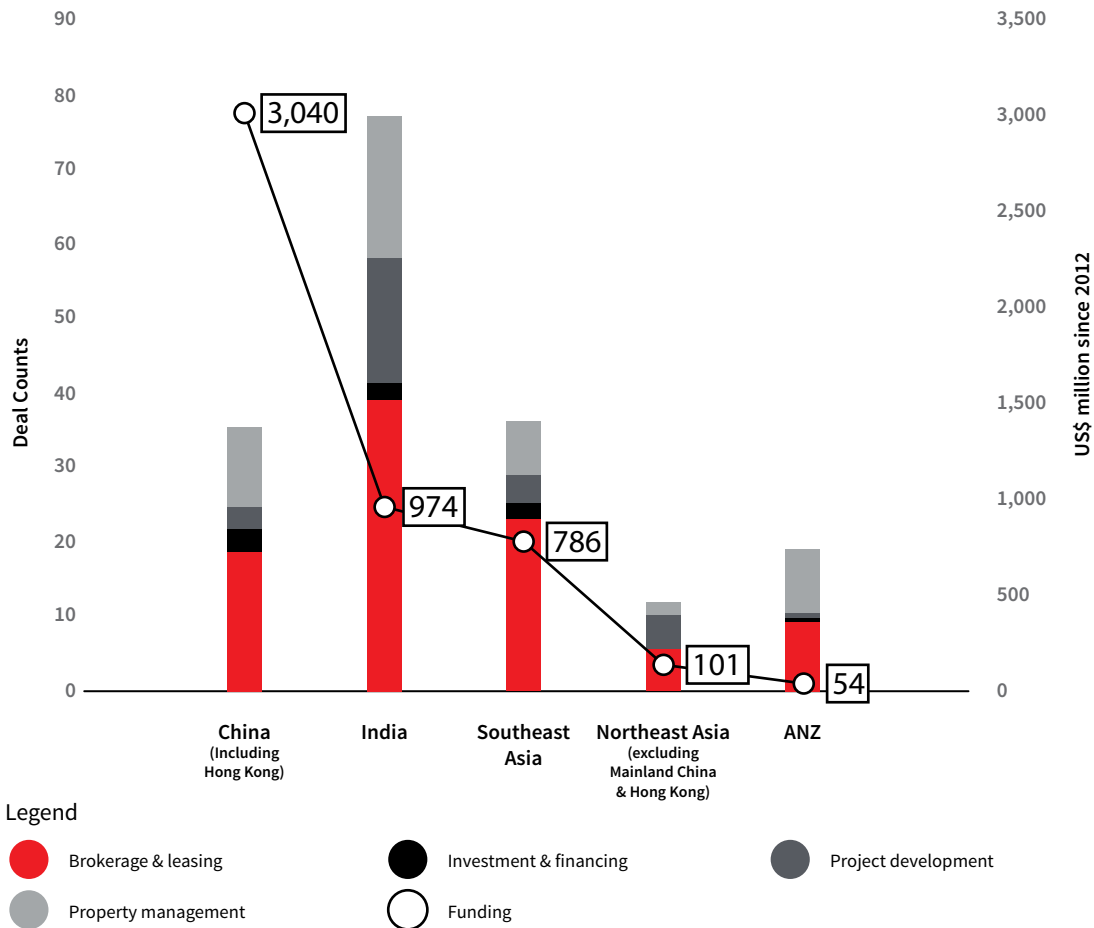
Personal loans

Instalment payment platforms for housing rent and mortgages could potentially act as a form of securitisation. Fintech start-ups are trying to take on the burden of payments in exchange for monthly instalments from users.



Proptech by geography

All regions - Start-up Concentration



Graph 6: All Regions – Start-up Concentration

Across the Asia Pacific region, China (including Hong Kong) and India are the two most dynamic markets for proptech. India tops the list in number of deals while China (including Hong Kong) surpasses other regions in funding values. Other regions (Southeast Asia, Northeast Asia excluding Mainland China & Hong Kong, and Australasia) are catching up but the gaps between them and the two leaders are still considerable, especially when comparing at a country level.

Among the proptech verticals, Brokerage and Leasing appears to dominate in all examined regions. Specifically, start-ups in Brokerage and Leasing have received nearly 90% of total Asia Pacific proptech funding since 2012. Notably, despite a regional thriving fintech landscape, real estate seems to receive limited attention from the regional fintech community as Investment and Financing is low on both deal count and funding values.

There are several economic, social, technological and political factors that could affect proptech’s development within the region:

Economic factors:

Asia Pacific is home to some of the largest emerging markets like China and India and rapid urbanisation is occurring across the region. Research from the United Nations (UN) shows that between 2000 and 2016, 40 out of 47 cities with the fastest growth rate in population are in Asia; 20 of them are in China alone¹⁵. There will result in a wider pool of users with diversified needs. This is where proptech start-ups can come in and use technology as a competitive advantage to thrive across all four verticals.

Social factors:

The middle class has become the rising force in consumption across Asia Pacific. It is estimated in 2015 that Asia Pacific's middle class account for 46% of the global middle class and represent over US\$10 trillion of consumption. These figures will increase to 65 % or around US\$38 trillion by 2030¹⁶.

In addition, millennials – one of the largest generations in history – are reaching their prime spending years¹⁷ and about to reshape the real estate market with their distinctive spending habits and expectations. In Asia Pacific, it is estimated that by 2020, 50% of the region's population are millennials¹⁸. Economic uncertainty, job losses, supply scarcity (in some markets like Singapore and Hong Kong) coupled with more liberal spending habits compared with their parents' generation, make it unattractive and difficult for millennials to own a house. Thus, they tend to lean towards flexible options (i.e: renting) or collaborative consumption (i.e co-working space). These demographic trends present excellent opportunities for proptech start-ups in Brokerage and Leasing as well as Investment and Financing to offer new products and services aimed at affordability for this customer segment.

However, consumer behaviours remain a formidable challenge to proptech's growth within the region. Many countries here are low-trust societies. Due to a lack of transparency in many local property markets, consumers are likely to favour human interactions for high value assets like real estate. This behaviour is more entrenched among baby boomers, who remain the main buyers of real estate. It is estimated that by 2017, the population of baby boomers (age ranges from 50 to 74 years old) make up 20% of Asia's total population.¹⁹

Technological factors:

Proptech in Asia Pacific is accelerated by technological sophistication of consumers. Asia accounts for 50% of total Internet users in the world²⁰. Besides, Asia Pacific tops the world in growth of smartphone traffic to the Internet²¹. As consumers get savvier, online shopping is booming in the region, paving the way for an 'Amazon experience' in the real estate market. Additionally, the rise of millennials in Asia Pacific's population will boost consumer preference for using technology.

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- 20 Asia accounts for 50% of total internet users in the world, BusinessToday.in, Kaur, A., 2016.
Source: <http://www.businesstoday.in/current/economy-politics/asia-accounts-for-50-per-cent-of-total-internet-users-in-the-world/story/238589.html>
- 21 Asia Pacific tops the world in growth of smartphone traffic to the internet, Adobe Digital Dialogue, Brady, S., 2017.
Source: <https://blogs.adobe.com/digitaldialogue/digital-marketing/asia-pacific-tops-world-growth-smartphone-traffic-internet/>

Political factors:

Governmental regulations have not always been able catch up with changing technology, presenting a hurdle for proptech start-ups. Policy challenges are the most visible in peer-to-peer accommodation start-ups – those similar to Airbnb. A notable example to show the substantial impacts of governmental policies on start-ups is the recently ceased operation of Roomorama, a short-term and vacation property rentals platform headquartered in Singapore, in July this year. It is reported that Roomorama had to deal with regulatory issues regarding its business model in many markets including Singapore²². Roomorama itself cited “regulatory headwinds” to be one of key reasons that “make it ever more challenging” to keep operating in the industry²³.

Blockchain is also facing resistance from governments of some countries, notably China. One of the largest cryptocurrency exchanges in China, BTCChina (BTCC) officially ceased domestic trading operation in September 2017²⁴ as a result of the government’s ban on initial coin offerings.

However, there have been countries supportive of blockchain and its potential for real estate. Specifically, governments of several other countries within the region have been active players in blockchain acceleration. Japan has already legalised Bitcoin and is considered the most advanced country in the crypto field globally. India’s government is also collaborating with corporates to further blockchain’s development within the country. While China may be regulating its financial markets tightly with a ban on initial coin offerings, it is still encouraging firms to research blockchain and considers it “a good technology”.²⁵

Drivers	Challenges
1. Rapid urbanisation and the boom of megacities	1. Consumer behaviour in property purchasing that leans towards human interactions for better trust.
2. The rise of the middle class and millennials	2. Rigid governmental regulations towards new business models or new technologies that could challenge the traditional ways of doing things
3. Improved technology-savviness among consumers	
4. Selective support from governments	

Table 2: Summary of Drivers and Challenges of Asia Pacific’s PropTech

22 Roomorama, Singapore’s answer to Airbnb stops accepting bookings, TechInAsia, Ellis, J., 2017.
Source: <https://www.techinasia.com/roomorama-stops-bookings>

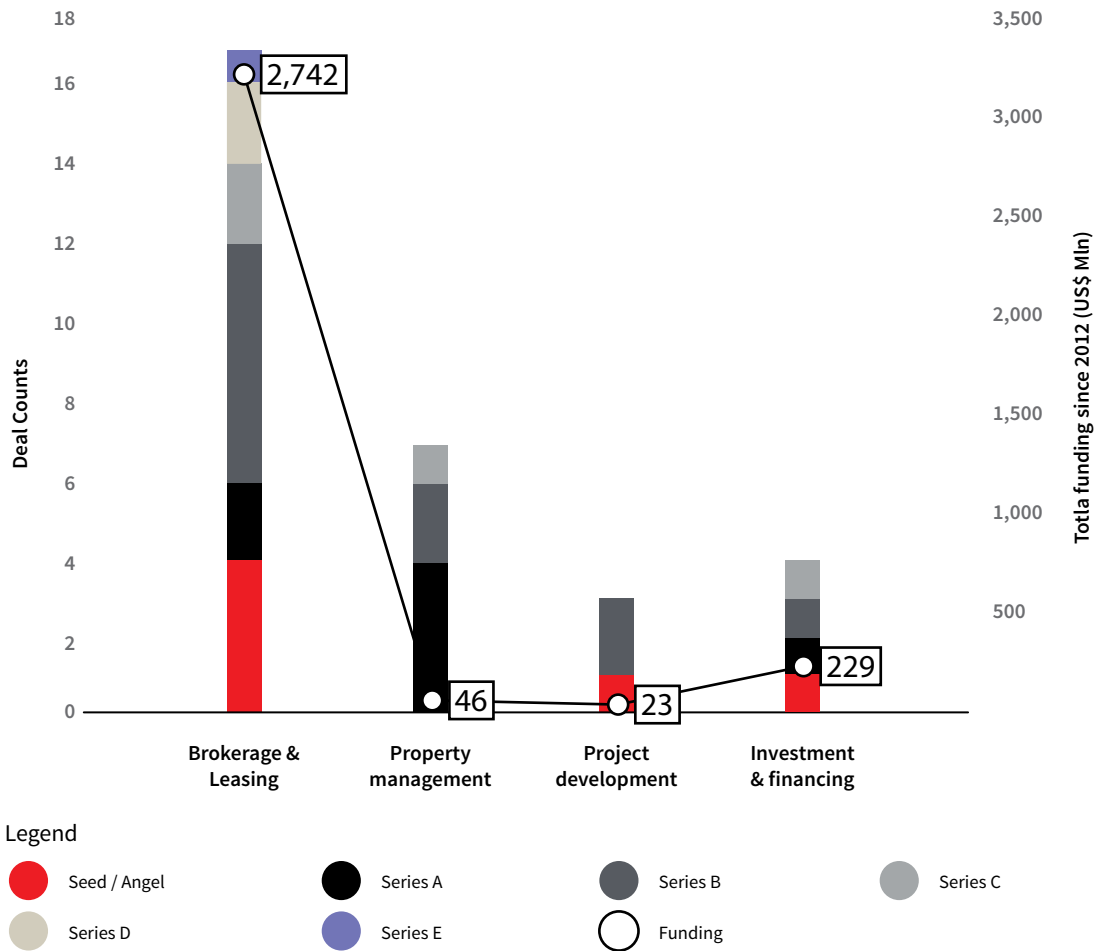
23 Roomoram.com, n.d. Source: <http://roomorama.com/>

24 State of the Blockchain: Japan rises as Bitcoin market leader, TechInAsia, Seng, A., 2017.
Source: <https://www.techinasia.com/talk/state-blockchain-japan-take-over-cryptocurrencies>

25 China banned fundraising through ICOs, but wants firms to research blockchain, CNBC, 2017.
Source: <https://www.cnbc.com/2017/09/11/chinas-ico-ban-necessary-but-should-not-stop-blockchain-research-says-pboc-official.html>

China (including Hong Kong)

China - Start-up Concentration



Graph 7: China – Start-up Concentration

Home to six out of 31 megacities in the world²⁶ in 2016, Mainland China presents a highly dynamic proptech landscape. Despite having only 23 out of 179 proptech start-ups in Asia Pacific; Mainland China has received the nearly 60% of Asia Pacific’s proptech funding since 2012, with most of the funding flowing into Brokerage and Leasing vertical. China’s Lianjia.com has raised US\$1.69 billion for its tech-enabled brokerage business. The proptech unicorn, which is arguably China’s biggest estate agent chain - is taking a mixed online – offline (O2O) approach to differentiate from its web-only rivals. At the end of 2016, the company had 6,000 shops with 120,000 staffs²⁷.

Lianjia is the new biggest proptech unicorn to date in China; yet, the country also has three other notable proptech unicorns²⁸: Mofang Gongyu, which is stated to be one of the largest institutional rental apartment operators in China²⁹; Fangdd - an O2O platform and Aiwujiwu - an online real estate agency; both of which were reported to be the most well-funded proptech startups from 2011 to the beginning of 2016³⁰.

26 The World’s Cities in 2016, United Nations, 2016. Source: http://www.un.org/en/development/desa/population/publications/pdf/urbanization/the_worlds_cities_in_2016_data_booklet.pdf

27 16 startup unicorns that took flight in 2016, TechInAsia, Millward, S., 2016. Source: <https://www.techinasia.com/new-startup-unicorns-2016>

28 Crunchbase Unicorn Leaderboards, Techcrunch.com, 2017. Source: <https://techcrunch.com/unicorn-leaderboard/>

29 Mofang Gongyu, CB Insight, n.d. Source: <https://www.cbinsights.com/company/mofang-gongyu>

30 Global funding to real estate explodes, with startups raising \$1.7B in 2015, CB Insight, 2016. Source: <https://www.cbinsights.com/research/real-estate-tech-funding-2015/>

Brokerage and Leasing start-ups in Mainland China are probably driven by the country's strong desire for house ownership³¹. Notably, while millennials' home ownership remains rare around the world, up to 70% of Chinese millennials have their own house. It is also revealed that up to 94% of Chinese millennials plan to buy property within the next five years, which is significantly higher than developed markets' figures, let alone the rest of Asia's³².

Chinese consumers have become highly tech-savvy since the rise of WeChat. This dominant channel of communication and transactions – 700-plus million active users and counting³³ – has accustomed them to the use of the Internet as the easiest means to make purchases.

In support of the growing home purchase market, the Property Management vertical in Mainland China has also begun to enjoy its day in the sun, especially in smart home fixtures and controls.

Unlike Mainland China, Hong Kong is a relatively mature market with great illiquidity. Such status, however, presents great opportunities for proptech to grow as the market itself has numerous challenges that traditional players cannot solve yet. Proptech start-ups' participation would help improve productivity and lower the cost of doing business. Hong Kong's clients are reported to be open-minded and willing to try out new methods; which indicates traditional ways of doing business in Hong Kong's real estate market are not as effective as they would like yet³⁴. Brokerage and Leasing is also the most popular vertical among Hong Kong start-ups. Several sub-verticals in Brokerage and Leasing that Hong Kong's start-ups are concentrated in include Sales, Marketing and CRM, and smart home fixtures and controls. Notably, a large proportion of funding in the Investment and Finance vertical for China (including Hong Kong) is attributed to WeLend, a Hong Kong-based proptech start-up that managed to raise US\$160 million in Series B funding.

31 Why are Chinese so obsessed with buying property?, Juwai.com, 2017.
Source: <https://list.juwai.com/news/2017/06/why-are-chinese-so-obsessed-with-buying-property>

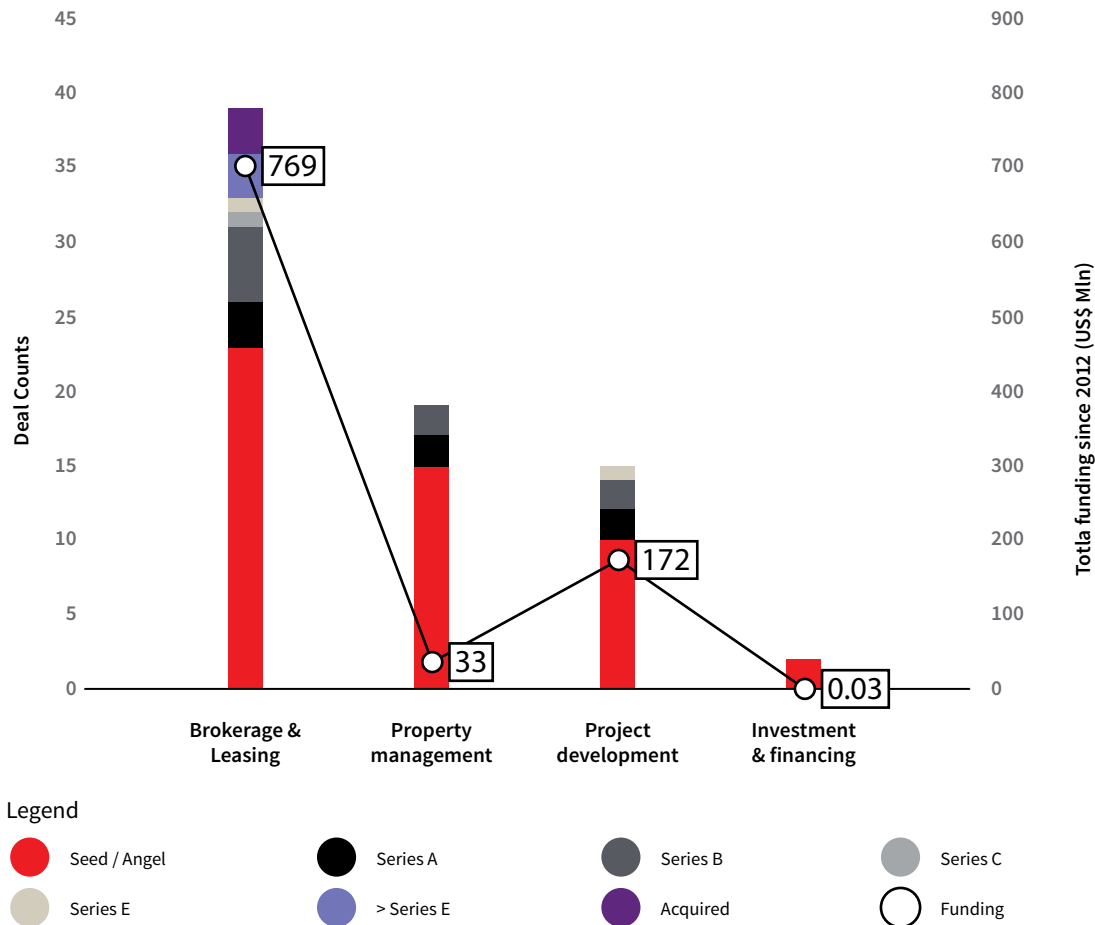
32 Ibid

33 How WeChat became China's app for everything, Fast Company, Chao, E, 2017.
Source: <https://www.fastcompany.com/3065255/china-wechat-tencent-red-envelopes-and-social-money>

34 The rise of Proptech in Hong Kong, Urbanservedoffices.com, n.d.
Source: <http://urbanservedoffices.com/news/detail/the-rise-of-proptech-in-hong-kong>

India

India - Start-up Concentration



Graph 8: India – Start-up Concentration

Like China, India’s proptech sector is fuelled by its rapid urbanisation; in fact, real estate is one of the largest industries in India³⁵. India has the largest number of start-ups (77 of 179 funded proptech start-ups). However, compared with China (including Hong Kong), there are many more start-ups in Seed and Angel funding stages, which could partly explain why the country receives less overall funding than China (including Hong Kong) despite outnumbering it in deal count.

Brokerage and Leasing dominates India’s proptech scene. This is due to the growth of the Indian middle income population. It is estimated that the country’s middle class is almost half of its total population, and among the highest-consuming middle class groups in the world³⁶. With e-commerce rising in India, consumers are turning to the Internet to purchase goods and services, thereby creating the potential for a robust online property market. But it must be noted that such changes in purchasing habits would take time as most Indians still prefer direct interactions to settle property transactions.

35 How PropTech is opening up India’s property market, JLL, Doshi, R., 2017. Source: <http://www.jllrealviews.com/places/how-proptech-is-opening-up-india-property-market/>
 36 The Asia Real Estate Market 2016, Nomura Research Institute, 2016. Source: https://www.nri.com/~media/PDF/jp/opinion/r_report/kinyu_keizai/asiareport2016_en.pdf

In addition, Indian proptech start-ups are subject to governmental regulation challenges as extensive paperwork is normally required to transact a property. However, the situation is likely to improve gradually. In May 2017, the government implemented the Real Estate (Regulation and Development) Act or RERA to improve transparency in the sector, which would eventually streamline the required process of property transactions³⁷.

India's proptech scene further diverges from China (including Hong Kong)'s as seen in its active Project Development and Property Management verticals. Growth in these verticals are led by start-ups that focus on residential home improvement/design (Livspace) and maintenance (Homejoy). With 60 million new homes expected to be built between 2018 and 2024³⁸, demand for such services in India can only increase.

37 How PropTech is opening up India's property market, JLL, Doshi, R., 2017.

Source: <http://www.jllrealviews.com/places/how-proptech-is-opening-up-india-property-market/>

38 \$1.3 trillion housing boom set to be India's next growth driver, Bloomberg, Chaudhary, A. & Mahrotri, P.T., 2017.

Source: <https://www.bloomberg.com/news/articles/2017-05-08/-1-3-trillion-housing-boom-set-to-be-india-s-next-growthdriver>

Viewpoint: Unmet needs remain in India's crowded playing field



Vaibhav Agrawal

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The Indian property market is seeing a divergence between the primary and secondary residential markets. The primary markets are over-served by new developers and thus experiencing a supply glut of some 11 million unsold homes. Meanwhile, the rental and secondary markets are recession-proof with about a million homes sold each year.

However, the lack of institutional trust in the secondary market caused by fake listings or unprofessional brokers, is a serious challenge to potential home buyers. There is a real need for reliable information and professional service.

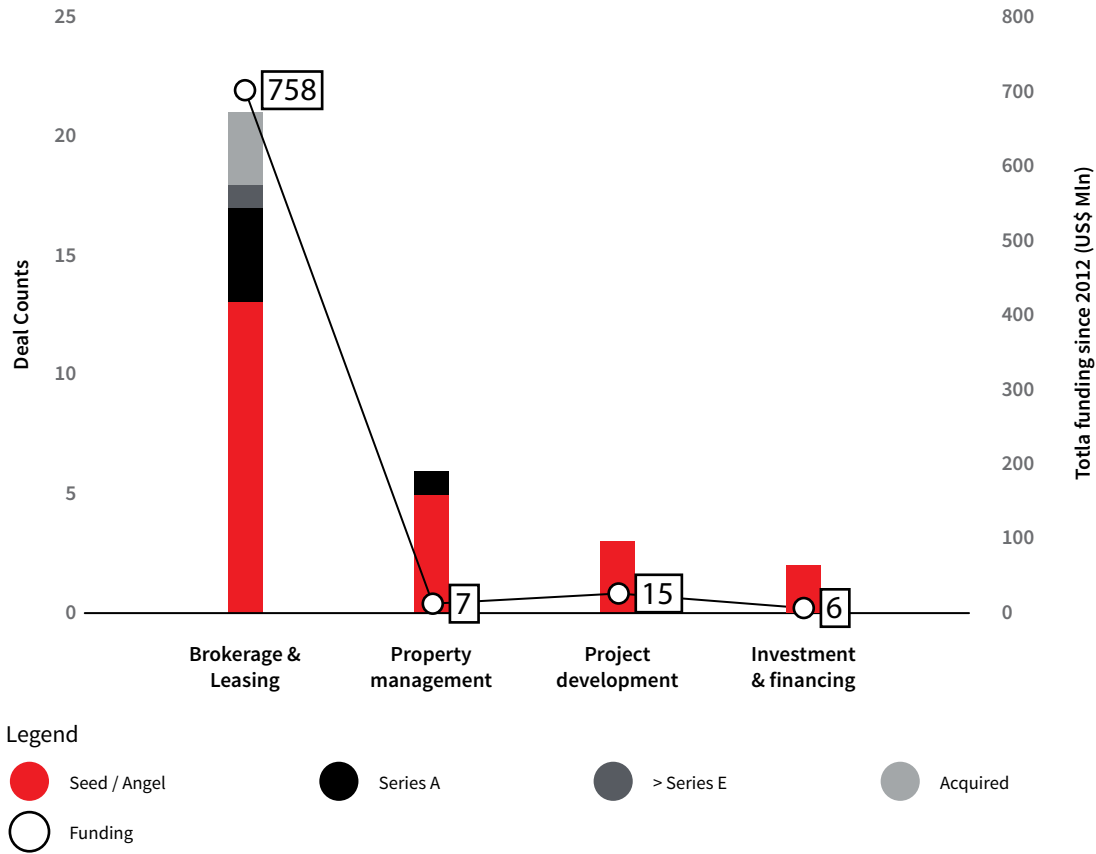
Tech-enabled brokerages such as FastFox (Lightspeed is an investor) are a welcome medium to help home buyers and tenants overcome these challenges as they give the assurance of accurate information and professional service.

We also see new needs evolving – young, migrant workers (between 20 to 32 years old) tend to move jobs frequently and see no point in buying, especially since rental rates are much lower compared to purchase prices. The emergence of an eco-system around renting makes it a much more attractive proposition.

In the future, there are two competing forces – the traditionally local nature of the property business and the stagnation of supply. Whoever is able to build the brand that connects supply with buyers will win the market. There are opportunities for the proptech firms who are able to serve the consumers most efficiently and transparently.

Southeast Asia

SEA - Start-up Concentration



Graph 9: South East Asia – Start-up Concentration

The Southeast Asian countries examined in this report are Indonesia, Malaysia, Singapore, the Philippines, Thailand and Vietnam.

Southeast Asia’s proptech sector is much younger and smaller compared with two regional giants like China and India. Following the regional trend, Brokerage and Leasing is the pioneering vertical, receiving 96% of total funding. Most of the start-ups in this vertical (except for PropertyGuru, which recently raised US \$129 million) are relatively young compared to start-ups from other regions.

Within the region, Singapore with its supportive start-up eco-system is the obvious leader. However, Singapore’s limited population and size is not ideal for scaling. The growth trajectory of Singaporean proptech start-ups like PropertyGuru would be to operate throughout the region to gain sufficient scale³⁹.

³⁹ Proptech in Asia: an emerging story, Disrupt Property, FitzGerald, J., 2016. Source: <http://disruptproperty.com/blog/proptech-in-asia/>

Malaysia also has formidable proptech players, notably iProperty Group, which was acquired by News Corp's Australian real estate website company REA Group Ltd for US\$414 million in 2015. Other countries like Indonesia and Thailand also have some local property search portals but their scalability remains largely unproven given limited product sophistication and relatively underdeveloped markets⁴⁰.

The primary challenge in the region seems to be changing consumers' habits. Even in a more developed market like Singapore, getting people to make decisions on high-value assets like property with minimal human interaction remains difficult⁴¹.

Regardless, the consumer focus of proptech start-ups in Southeast Asia may prove a boon in the long run. The existing internet user base of 260 million is expected to grow to 480 million users by 2020, while online advertising spend is projected by Google and Temasek Holdings to increase from US\$2.1 billion in 2015 to US\$9.9 billion in 2025⁴².

Notably, we have begun to observe start-ups in Singapore (pre-funding stage), such as Averspace, that use blockchain to allow home buyers to complete transactions directly with home owners.

40 Proptech in Asia: an emerging story, Disrupt Property, FitzGerald, J., 2016.

Source: <http://disruptproperty.com/blog/proptech-in-asia/>

41 Singapore Proptech: challenging the status quo, Singapore Business Review, Wong, R., 2017.

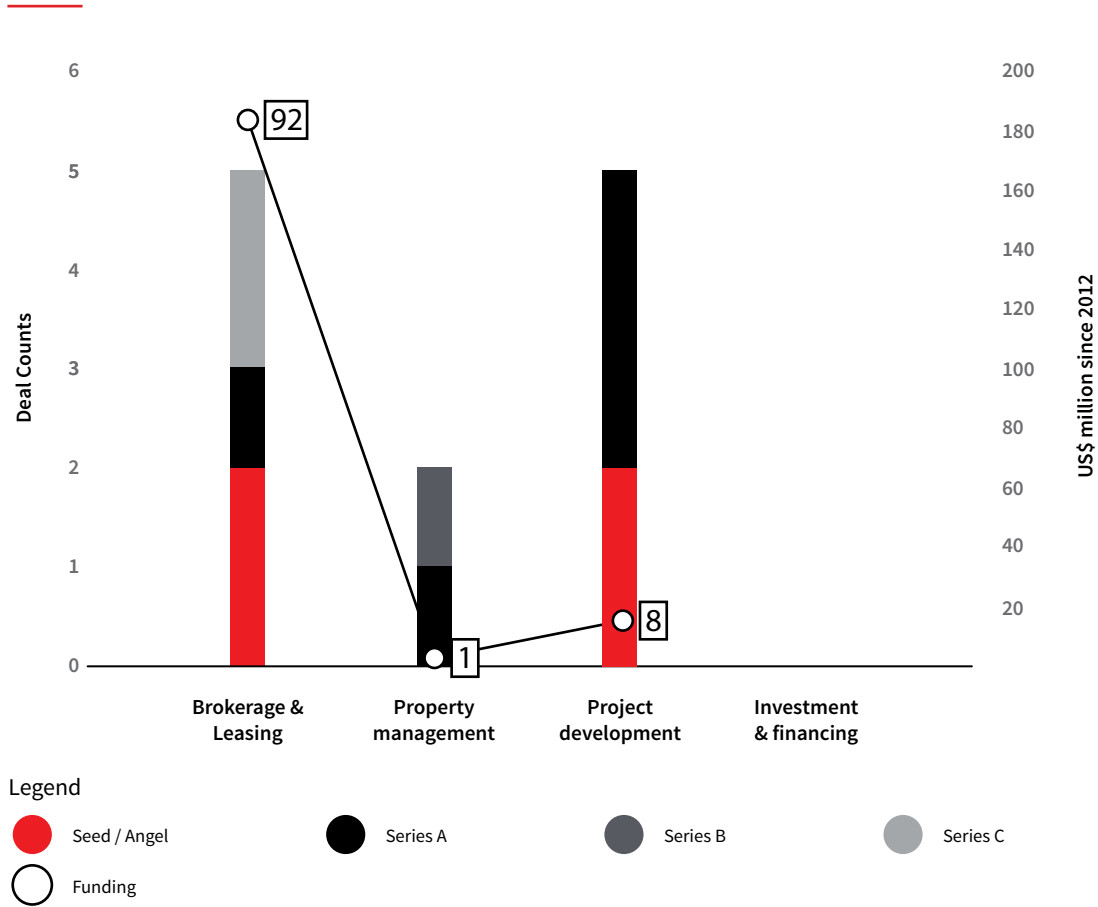
Source: <http://sbr.com.sg/residential-property/commentary/singapore-proptech-challenging-status-quo>

42 E-economy SEA – Unlocking the \$200 billion digital opportunity in South East Asia, Google and Temasek, 2016.

Source: <https://www.slideshare.net/economySEA/economy-sea-by-google-and-temasek>

Northeast Asia (excluding Mainland China and Hong Kong)

Northeast Asia (exclud. Mainland China & Hong Kong) - Start-up Concentration



Graph 10: Northeast Asia (excluding Mainland China & Hong Kong) – Start-up Concentration

Due to relatively mature markets and a declining population growth rate, Northeast Asia, namely Taiwan’s⁴³, Korea’s and Japan’s proptech scenes are less vibrant than the three previously-examined regions’.

Among examined markets in Northeast Asia, Japan appears to be the most exciting. With the initiatives of Abenomics – increased public infrastructure spending, depreciation of the yen, and quantitative easing by Bank of Japan – the country’s real estate market has become bullish with investment rising 10% year-on-year for the first half of 2017; transaction volumes are expected to keep growing⁴⁴.

The use of technology in Japan’s real estate sector has been increasing for the past couple of years driven by the government’s focus on encouraging entrepreneurship. Both government and real estate stakeholders are leveraging technology to expand the property market and maximise its reach. The Japanese government is even planning to use blockchain technology to underpin their property registries to prevent tampering⁴⁵. A bullish real estate market together with technology savviness would make Japan’s proptech scene promising in the coming years.

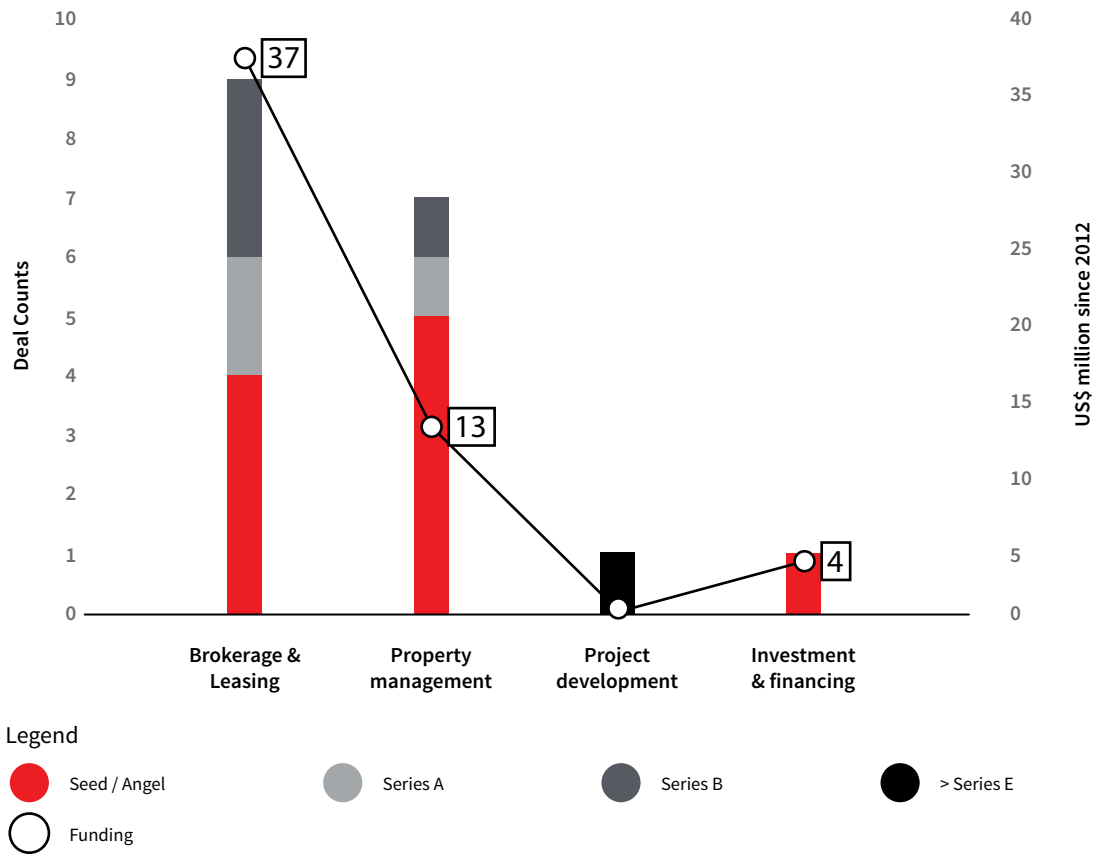
43 For the purposes of this report, we have included Taiwan in Northeast Asia to reflect its real estate market dynamic.

44 Japan’s real estate market to stay bullish, JLL, 2017.
Source: <http://www.theinvestor.jll/news/japan/00/japans-real-estate-market-stay-bullish/>

45 Japan to tidy up scattered property records, Nikkei, 2017.
Source: <https://asia.nikkei.com/Markets/Property/Japan-to-tidy-up-scattered-property-records>

Australasia (Australia and New Zealand)

Australasia - Start-up Concentration



Graph 11: Australasia – Start-up Concentration

Australasia’s start-ups are primarily in Brokerage and Leasing, and Property Management. The former is due to the relatively lower barriers to entry into the space while the success story of construction software firm Aconex, which has completed an Initial Public Offering, has encouraged more start-ups to look into that space. Of the US\$37.4 million invested in the Brokerage and Leasing vertical, US\$24.8 million went into a pair of agent-matching start-ups – OpenAgent and LocalAgentFinder.

Australia’s strong desire for home ownership offers a catalyst for proptech start-ups, especially those in the Brokerage and Leasing vertical. Also, the Australian government has been supportive towards fintech, with policies and regulations assisting fintech start-ups and innovators to develop, test and globally launch their products and services⁴⁶. It is expected that the number of deals and funding values in the Investment and Financing vertical would progress considerably as a result.

⁴⁶ Australia’s FinTech priorities, The Treasury Australian Government, n.d.
Source: <https://fintech.treasury.gov.au/australias-fintech-priorities/>

Australia's legal and business similarities with the UK favour the growth of proptech as they make it easier for local start-ups to replicate successful business models available in the UK⁴⁷ – a very dynamic market for both proptech and fintech.

Compared with Australia, New Zealand proptech is not as active. It is expected that proptech in New Zealand will face numerous challenges due to slump in demand. In this September, the number of houses sold declined by 20% compared to this time last year, which was assumed to be the result of lending restrictions and election uncertainty⁴⁸.

47 Proptech in Asia: an emerging story, Disrupt Property, FitzGerald, J., 2016.
Source: <http://disruptproperty.com/blog/proptech-in-asia/>

48 Housing market slumps around New Zealand, Newshub, Shepherd, S., 2017.
Source: <http://www.newshub.co.nz/home/money/2017/09/housing-market-slumps-around-new-zealand.html>

What is the future of proptech in Asia Pacific?

The continuing power of disruptive technologies

Aside from blockchain, which has been discussed above, there are several other disruptive technologies that could reshape the real estate industry in Asia Pacific.

Artificial Intelligence or AI is too promising to be missed in the real estate industry. AI could transform it in a number of ways, such as machine learning in search engines that could precisely address a customer's needs and adapt with their changing preferences; image recognition that enables customers to classify, tag and organise images of properties in real-time; and chatbots that help automate real estate processes such as appointment bookings or information provision⁴⁹.

The future opportunities of real estate powered by AI are vast. Despite being less technologically advanced compared with US or Europe, Asia Pacific is very active in developing AI, especially in countries like Japan, China and Singapore. The region has been predicted to become the primary global market for AI⁵⁰. Even though the percentage of AI-powered services (i.e: location intelligence) within the real estate industry in Asia Pacific is still limited compared with the US and Europe (10% versus 87%), the potential for high growth is undeniable given the substantial size of Asia's real estate market⁵¹.

Another new technology that is worth noting is 3D printing. 3D printing could transform the commercial real estate market considerably, especially in the Project Development vertical as it enables construction activities to be faster, of a higher quality and at lower costs. Looking ahead to the future, tenants might consider using 3D printing technology for spatial design purposes while real estate developers could also evaluate tenants' impact and usage with this technology to make informed decisions about location and development⁵².

Nanyang Technological University of Singapore is reported to be studying the feasibility of using a 3D printer to print an entire floor of a high rise building in one go⁵³. Some companies in China have also utilised 3D printing to build low-rise buildings⁵⁴.

Considering other thriving disruptive technologies such as VR, drones, predictive analytics, etc. it is expected that the real estate industry on both the global and Asia Pacific's stages would be transformed tremendously within the foreseeable future.

The emergence of proptech in commercial real estate

Currently, proptech is dominated by start-ups focusing on the residential real estate market. This is a common trend both globally and in Asia Pacific. According to CB Insight, there are up to 96 active proptech start-ups in the residential market identified globally while the number is only 53 for the commercial market⁵⁵. One reason could be the larger size of residential market, which makes it more likely for a start-up to succeed and thus, get funding more easily⁵⁶.

49 5 ways Artificial Intelligence is disrupting real estate, Restb.ai, 2016.

Source: <http://blog.restb.ai/archive/5-ways-artificial-intelligence-is-disrupting-real-estate>

50 The state of AI adoption and development in Asia, Enterprise Innovation, Lam, S., 2017.

Source: <https://www.enterpriseinnovation.net/article/state-ai-adoption-and-development-asia-2077211976>

51 On the cutting edge of real estate technology in Asia, Bangkok Post, SCB Economic Intelligence Center, 2017.

Source: <https://property.bangkokpost.com/news/1280079/on-the-cutting-edge-of-real-estate-technology-in-asia>

52 Innovations in commercial real estate – Preparing for the city of the future, Deloitte, 2016.

Source: <https://www2.deloitte.com/content/dam/Deloitte/us/Documents/Real%20Estate/us-innovations-in-commercial-real-estate.pdf>

53 The state of AI adoption and development in Asia, Enterprise Innovation, Lam, S., 2017.

Source: <https://www.enterpriseinnovation.net/article/state-ai-adoption-and-development-asia-2077211976>

54 Ibid.

55 Home, sweet home: 96 Tech startups reshaping residential real estate, CB Insights, 2016.

Source: <https://www.cbinsights.com/research/residential-real-estate-tech-market-map-company-list/>

56 Proptech 3.0 – The future of Real estate, Said Business School, Baum, A., 2017.

Source: https://www.sbs.ox.ac.uk/sites/default/files/Press_Office/Images/proptechreport/PropTech%203%20-%20The%20Future%20of%20Real%20Estate.pdf

The main issue is really the more complex nature of transactions in the commercial market – high transaction volumes and values are often accompanied by multi-party involvement as well as little data availability and transparency. The commercial real estate industry has always been discreet about some aspects of its operations such as lease rental rates, property prices and valuations to preserve competitive advantage⁵⁷. Such practices make it hard for start-ups to venture into commercial real estate market.

However, changes are coming. There have been a few factors that would accelerate proptech in the commercial property market in Asia Pacific.

Smart cities: Smart cities initiatives are being implemented all over the world. Asia Pacific is no exception. Singapore is actively pushing its Smart Nation programmes; India has its Smart Cities Mission, which aims to turn 100 cities all over the country into smart cities. More than 500 cities in China have started or will start their smart city transformation in 2017⁵⁸. Japan and South Korea also have their own smart cities, even though the scale might not be on the same level compared to China and India.

The evolution of smart cities would prompt the need for smart property development and management, giving a boost to proptech. For example, smart cities are highly data-driven, as extensive data collection and analysis are necessary to fully realise the benefits of smart cities. This would create opportunities for commercial real estate players to act on data they possess to make more informed decisions regarding which locations to invest in, what the appropriate tenant mix would be, or how to improve valuation methodologies. These questions could be answered effectively with the support of proptech start-ups that are specialised in predictive analytics.

Blockchain: The power of blockchain also expands into the commercial real estate market. Blockchain could improve the property search process, accelerate pre-sale due-diligence, ease leasing and subsequent property and cash flow management and finally empower informed decision-making⁵⁹. As a hotspot for blockchain, Asia Pacific could soon expand this technology's application into various industries including real estate, specifically the commercial sector.

Spill-over effects: Successful cases of worldwide proptech start-ups operating in the commercial market would act as an inspiration and catalyst for start-ups in Asia Pacific to step up and venture into this sector. On the global stage, an increasing number of start-ups have realised that the commercial market has been neglected. Some notable names include VTS (a merge of Hightower and VTS), the software solutions provider that helps real estate professionals and owners manage property sales and leasing, as well as Floored (which was acquired by CBRE), a specialist in 3D graphics and technology for the hospitality and real estate industry⁶⁰.

The rise of proptech focused funds / accelerators and the increasing participation of incumbents

In recent years, we have witnessed an increasing number of funds fully dedicated to proptech. The number of initiatives and amount of corporate venture capital led by real estate incumbents is accelerating the growth of proptech.

In Australia, there is a fund fully-dedicated to proptech called Esho Ventures. Esho Ventures approaches proptech start-ups in an unconventional way by screening their ability to leverage Facebook Messenger. The US\$ 850 million⁶¹ fund is stated to focus on the landlord-tenant relationship, the impact of millennial lifestyles on the real estate market, and construction technology.

57 Blockchain in commercial real estate – The future is here!, Deloitte, 2017.
Source: <https://www2.deloitte.com/content/dam/Deloitte/us/Documents/financial-services/us-fsi-rec-blockchain-in-commercial-real-estate.pdf>

58 China's "smart cities" to number 500 before end of 2017, ChinaDaily.com.cn, 2017.
Source: http://www.chinadaily.com.cn/china/2017-04/21/content_29024793.htm

59 Blockchain in commercial real estate – The future is here!, Deloitte, 2017.
Source: <https://www2.deloitte.com/content/dam/Deloitte/us/Documents/financial-services/us-fsi-rec-blockchain-in-commercial-real-estate.pdf>

60 These startups are bringing commercial real estate into 2017, Forbes, Barzilay, O., 2017.
Source: <https://www.forbes.com/sites/omribarzilay/2017/01/05/these-startups-are-bringing-commercial-real-estate-into-2017/#2924f97177ac>

61 Why this proptech fund is taking a Facebook-focused approach to investing, Property-report.com, FitzGerald, J., 2017.
Source: <http://www.property-report.com/detail/-/blogs/why-this-proptech-fund-is-taking-a-facebook-focused-approach-to-invest-14>

Established incumbents are also getting more involved in the start-ups community as they realise working with start-ups – be it in an investment or partnership model – is an effective way to keep up with proptech developments. In May, 2016, Singaporean leading property developer CapitaLand, announced to set up a S\$15 million (~US\$ 11 million) start-up fund⁶². In 2016, real estate company Savills invested in the pre-Series A round of Pegaxis, a Singaporean start-up offering an online marketplace connecting property managers and services providers and an online suite of tools for managers to track procurement activities.

JLL has implemented a number of initiatives to foster proptech regionally. The company was the main sponsor of the region's first proptech hackathon in August 2017, Hood Disrupt. JLL also launched an Indian technology venture in 2016, which has already invested in Foyr.com specialising in virtual reality and augmented reality to facilitate interiors' customisation, the company also launched a new global business unit, JLL Spark, which will identify and deliver new technology-driven real estate service offerings and is helmed by two former Silicon Valley veterans⁶³.

Proptech – a land of unicorns?

It is estimated that nearly one-third of the world's private unicorns — start-ups valued at over US\$1 billion — are headquartered in Asia. Within Asia Pacific, eight out of 15 countries are reported to have at least one start-up that has managed to raise over US\$ 100 million. China holds the leading position with over 70% of Asia's billion-dollar start-ups⁶⁴.

In view of the numerous drivers mentioned, the future of proptech is bright in Asia Pacific. We anticipate that its funding values in Asia Pacific in 2020 alone could reach US\$4.5 billion.

As proptech is the convergence of property and technology, we believe that the growth of proptech depends concurrently on the state of the real estate market and technology savviness.

In order to understand where this could lead, we have mapped a number of markets in Asia Pacific onto a matrix consisting of the real estate market size and digital savviness to identify the countries offering the best conditions for proptech to thrive, and thus which have the highest chances of nurturing unicorns in this field.

Each country's real estate's market size is measured by the Total Investable Real Estate Universe estimated by JLL while Digital Savviness is measured by Networked Readiness Index (NRI) – an index reflecting “how well an economy is using information and communications technologies to boost competitiveness and well-being” by the World Economic Forum⁶⁵.

NRI is a composite indicator made up of four main categories and 10 subcategories with 53 individual indicators. It measures a country or territory's performance in Environment (political and regulatory environment, business and innovation environment); Readiness (infrastructure, affordability, skills); Usage (individual usage, business usage, government usage) and Impact (Economic impacts, Social impacts). With its comprehensive scopes, NRI can be justified as an indicator to measure the technology savviness of one country or territory.

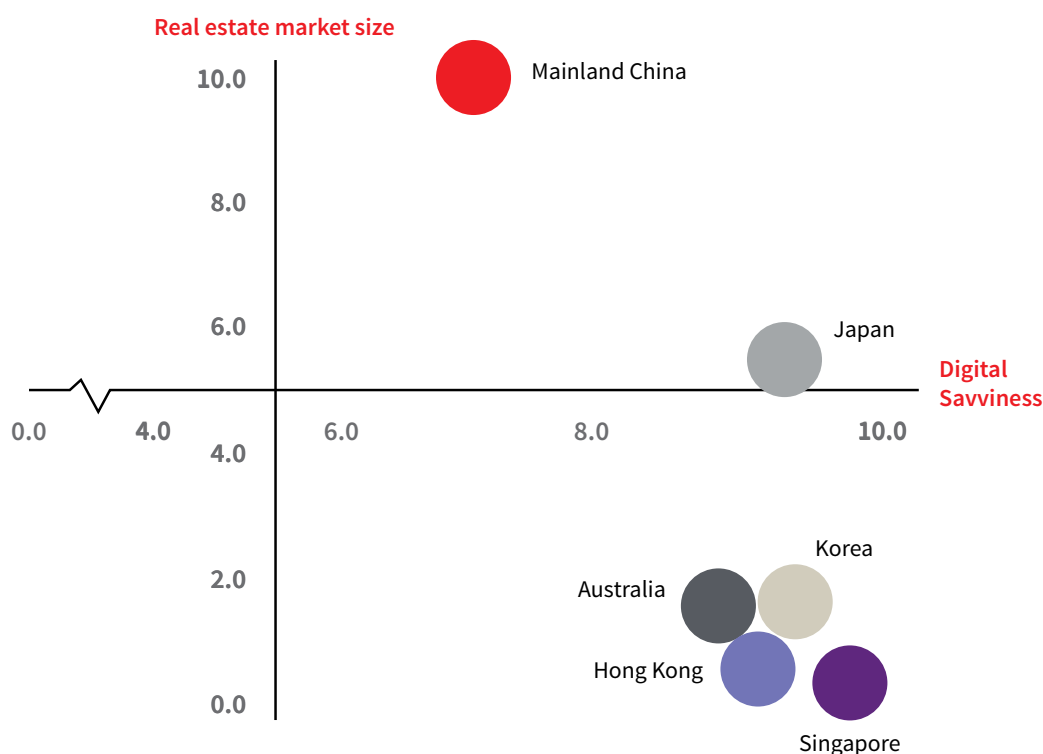
Total investable real estate universe (in US\$ billion) and NRI of each country and territory will be converted into a 10-grade scale since they have different units of measurement.

62 Proptech in Asia: an emerging story, Disrupt Property, FitzGerald, J., 2016. Source: <http://disruptproperty.com/blog/proptech-in-asia/>

63 JLL press release, July 2017: <http://www.ap.jll.com/asia-pacific/en-gb/news/407/jll-launches-jll-spark-with-silicon-valley-veterans>

64 Startup Continent: the most well-funded tech startups in Asia and the Pacific, CBInsights, 2016. Source: <https://www.cbinsights.com/research/asia-pacific-tech-startups-map/>

65 The Global Information Technology Report 2016, World Economic Forum, 2016. Source: <https://www.weforum.org/reports/the-global-information-technology-report-2016>



Graph 12: Country Mapping for Proptech Development

Based on the mapping, we expect that Mainland China and Japan are the two countries that have the most chance of proptech unicorns as the local markets are big enough for start-ups to scale and their level of technology savviness would encourage stakeholders to embrace technology as a solution for their different needs in the property market (i.e purchasing, renting, developing, etc.). In fact, Mainland China already has its proptech unicorn – Lianjia, which claims to have 7% market share in China’s online and offline real estate market. The company is expanding aggressively with active presence in 36 cities all over China as in April 2017⁶⁶. Other proptech unicorn names include Mofang Gongyu, Fangdd, and Aiwujiwu.

Japan's significant real estate market size coupled with its technological edge puts the country's proptech start-ups in good stead. Japan's proptech has good growth potential in Brokerage and Leasing vertical, especially in short-term leasing as the country may soon face the shortage of short-term stays accommodation due to an increase in inbound tourism in view of the upcoming Tokyo Olympics 2020⁶⁷.

There are other countries that scored relatively high in technology savviness, but their relatively small local markets will always pose a challenge towards growing market share and scaling. Growth would require penetration into other markets, which require greater resources and capacity as it demands a deep level of local knowledge. Well-established start-ups in these markets (Korea, Australia, Hong Kong, Singapore) could still expand their market reach and become a regional unicorn through partnerships, with locals players, investment or even mergers and acquisitions."

66 Vanke to invest \$440m in Chinese online real estate agency Lianjia, Deal Street Asia, Gaung, J.S., 2017. Source: <https://www.dealstreetasia.com/stories/vanke-to-invest-440m-in-chinese-online-real-estate-agency-lianjia-70735/>

67 Japan's answer to Airbnb, Hyakusenrenma, raises \$13 million, Venturebeat.com, Ikeda, M., 2016. Source: <https://venturebeat.com/2016/05/07/japans-answer-to-airbnb-hyakusenrenma-raises-13-million/>

India is another one to watch. The country has lagged behind Mainland China, Australia, Japan, Singapore and Hong Kong – these five markets alone account for 83% of commercial real estate investment flows in Asia Pacific in 2015⁶⁸ -- but it is projected to join the group in the next decade. The sheer number of proptech start-ups is testament to the potential of India's real estate growth.

However, at this stage it is not possible to quantify India's Total Investable Real Estate Universe due to challenges in capturing data as a result of a lack of transparency in transactions.

68 Changing Places: Demographic Drivers of Real Estate, JLL 2016.
Source: <http://www.jll.com/Documents/research/pdf/apac/AP-Changing-Places-Demographics-Paper-Sep2016.pdf>

Viewpoint: The win-win proposition for start-ups and corporates



Ervin Lim

*Head
CapitaLand C31 Ventures*

C31 Ventures was set-up to execute strategic investments in start-ups for CapitaLand. This means investing in capability building that is aligned with CapitaLand's strategy to support the core business.

We have the opportunity to leverage our significant asset base across multiple real estate classes and geographical locations to offer start-ups an opportunity to scale with us.

Beyond strategic investments, the CVC also continues to shore up CapitaLand's internal innovation capabilities through multiple engagement points. Marrying the scalability of a start-up together with the large customer base of a corporate is a win-win proposition for all parties in delivering a superior product and experience.

Embracing the potential

With rapid urbanisation, the emergence of the middle class and millennials, improved consumers' technology sophistication as well as governmental support in select countries and verticals, proptech in Asia Pacific seems to possess all the necessary ingredients to thrive.

Yet, it can only reach its full potential once certain conditions are in place, namely greater flexibility and openness in regulation, as well as an evolution in consumer habits.

The high concentration of start-ups in terms of both deal count and funding values in the Brokerage and Leasing vertical compared with other verticals like Investment and Financing, Project Development and Property Management, are indicative of the immaturity and relatively limited technological capabilities of start-ups in Asia Pacific compared to established markets like the US or Europe.

But proptech here is catching up fast, especially in countries like China and India. Asia Pacific possesses significant potential in various disruptive technologies, notably blockchain, with its possibility to scale across the large markets of Asia. The implication is clear: this region is an already thriving market for both real estate and technology.

With corporates waking up to the opportunity to overcome inefficiencies in their business lines and maximise their reach, start-ups too will begin seeing a growing market for their products and more interest from these corporates. This will result in new partnerships and perhaps some important new real estate players in the region.

This is just the start of the proptech story in Asia Pacific. We look forward to seeing it unfold in the coming years.