Jus Corpus Law Journal
Open Access Law Journal – Copyright © 2024 – ISSN 2582-7820
Editor-in-Chief – Prof. (Dr.) Rhishikesh Dave; Publisher – Ayush Pandey

The Arcane of PropTech Implication in Real Estate: A Balancing Act of Privacy and Transparency

Parvathy K Arun[a] Mahima Nidhi[b]

[a]Symbiosis Law School, Hyderabad, India [b]Symbiosis Law School, Hyderabad, India

Received 03 July 2024; *Accepted* 05 August 2024; *Published* 09 August 2024

Digitalisation has transgressed through geographical boundaries making real estate accessible to a global consumer base. PropTech refers to the integration of technology in the real estate industry to improve and disrupt the nuances of the market. The deployment of PropTech has enabled buyers to explore properties from the comfort of their homes and garner more domestic audiences. The current tangent in the growth of digitalisation in the real estate industry marks a trend that is in contrast traditional premise. In the exponential rise of digitalisation, data plays an undeniably integral role in commercial real estate transactions. Harnessing large amounts of data equips entrepreneurs to gain a competitive edge, understand customer preferences, and tailor an optimised business strategy in conformity with the current market trend. In stark contrast, commercial use of data has allowed the former to leverage a dominant position in the market, thereby purporting anti-competitiveness in the market. The present contribution delves into the implications of transparency in the real estate market, particularly in the context of PropTech. The tectonic shift to digital markets has restructured the framework of economic activities with respect to properties. PropTech innovations necessitate the collection and use of consumer data for furthering their efficiency in the market. This imposes a formidable onus on the PropTech companies to strategically manage their user data and tackle potential cyber threats and tackle concerns regarding data privacy. The paper proposes to strike a balance between consumer interest and safeguarding the innovative business models of the real estate industry. In lieu of the same, the paper draws a comparison with the structural framework on an international footing. The paper considers the role of technology in the sustainable transformation of the real estate industry, and its implication in the broader realms of transparency and data privacy.

Keywords: *real estate domain, digitalisation, proptech, data privacy, data security.*

INTRODUCTION

Digitalisation has had a profound impact on the social, political and economic structure of the society. A traditional real estate market is a slow-moving asset class.[1] Physical land records are the characteristic feature of the traditional real estate markets.[2] The exponential shift has challenged this narrative to the Property Technology also known as Prop Tech. PropTech essentially refers to the use of digital technology in contrast to the traditional tenets of real estate. In the facet of digital technologies, real estate is undergoing tremendous change, not only in the work environments but also in the nature of markets.[3] The concepts underlying the Industrial Revolution 4.0 include artificial intelligence, cloud computing and Internet of Things (IoT), and machine learning are driving factors that extend beyond crosscutting industrial verticals, manufacturing, and marketing.[4] The PropTech machinery integrates buyers and sellers across the globe and creates a global market for the real estate industry.

In light of the same, it is pertinent to understand the relationship between PropTech and the domain of Real Estate. Data and analytics play a pivotal role in the digital revolution in the real estate industry.[5] The datafication of the real estate industry helps buyers and users make informed decisions and enables stakeholders to gain a competitive edge in the market.[6] While the PropTech mechanism enables the stakeholders to make an informed decision by understanding consumer preference, forecasting the market's future, and demand trends and

[1] Satyanshu Mishra and Kopal Kesarwani, 'PropTech in India: Stepping Stones for a simplified Real Estate Sector' (*IJPIEL*, 12 April 2023) <https://ijpiel.com/index.php/2023/04/12/proptech-in-india-stepping-stones-for-a-simplified-real-estate-sector/> accessed 18 June 2024

[2] Vibhor Arya et. al., 'A Blockchain Framework for Proptech: Success Model Through Disintermediation and Self-regulation' (Intelligent Computing, Information and Control Systems, 2019)

[3] Carlos Delcios, 'Housing in the digital age: Trends and implications' (*Barcelona Centre for International Affairs*, December 2020) <https://www.cidob.org/en/publications/publication_series/notes_internacionals/245/housing_in_the_digital_age_trends_and_implications> accessed 11 April 2024

[4] *Ibid*

[5] Roger Burrows and Mike Savage, 'After the crisis? Big Data and the methodological challenges of empirical sociology' (2014) 1(1) Big Data & Society <https://doi.org/10.1177/2053951714540280> accessed 11 April 2024

[6] *Ibid*

analysing risk, the use of technologies makes it vulnerable to cyber threats, consumer data and privacy breaches.

With respect to the slow-paced dynamism of the real estate sector, the integration of technology in its intricacies has accelerated the growth of the former in the recent decade. Tech evangelists have long claimed the symbiotic relationship between technology and the advancement of the sector. The real estate sector has now typically become a data-driven market space. PropTech has thus assumed a role of substantial importance in the domain, with data-driven analytics being the core element of property technologies[7].

The hyper-dependency on data and digital transformation has made the domain of real estate an easy target for several malicious attacks that taters the foundation of data privacy and security. The myriads of private and sensitive information that real estate deals with, every fraction of its working, such as finance-related information, passport/driver's licence or other identification proofs, and data related to insurance, among others; causes the former to be an imperatively susceptible domain that necessitates imminent safeguarding. A survey conducted by KPMG showcased that 59.3% of the real estate authorities face the threat of cyberattacks.[8] Thus, it is necessary to navigate through the complexities of PropTech and the Real Estate sector to safeguard the cardinal right of privacy.

This paper aims to analyse the integration of technology in the realm of real estate. Furthermore, the present contribution seeks to delve into the intricacies of the digitalisation of the real estate market and the fundamentals of PropTech. Through a case-based analytical method, the paper comprehensively detailed the implications of the relationship between PropTech and data privacy.

DIGITALISATION OF THE REAL ESTATE MARKET

Real Estate contributes majorly to driving the national economy of the country. Aside from the conventional concept of buying and selling properties, it entails a broad range of activities. It

[7] Fabian Braesemann and Andrew Baum, 'PropTech: Turning real estate into a data-driven market?' (*Oxford Future of Real Estate Initiative,* 16th April 2020) <https://www.sbs.ox.ac.uk/sites/default/files/2020-05/PropTech%20Turning%20real%20estate%20into%20a%20data-driven%20market.pdf> accessed 07 April 2024

[8] *Ibid*

encompasses management of building, infrastructure and land, financing and designing.[9] Real estate growth is contingent on the dynamic interlink between construction, financing, marketing, management and regulation.[10] However, dealing with the right audience, transferring properties and interacting with the various stakeholders can be mired by the lack of information, excessive paperwork and complex procedures.[11] The advent of digitalisation has revolutionised the real estate industry into a digital mode, which essentially determines how the stakeholders and the market interact with each other. While the real estate industry is largely inching towards digitalisation, especially in the field of digital marketing, the onset of the COVID-19 pandemic has further accelerated the velocity with which the market is gearing towards the digital realm.

With the premise of 'Industrial Revolution 4.0,' digital technologies are integrated with real estate, which Artificial Intelligence, Cloud Computing, Blockchain, Smart contracting, data analytics tools, artificial intelligence, virtual reality, drones, home matching tools, etc facilitate.[12] In the real estate context's parlance, this is called the 'PropTech'. It is defined as the 'massive implementation of emerging technology within the real estate sector.'[13] PropTech Solutions and digital transformation are poised to unlock a plethora of substantial value for the consumers and the other stakeholders in the market.[14] The use of digital technologies in the real estate market is still in its nascent stage, and we are yet to map the opportunities and real potential of these innovations. Thus, only certain conjectures can be made based on the existing trends. The use of PropTech has enhanced the marketing reach of real estate companies. The integration of the PropTech ecosystem adds optimal value for the management staff of the facilities and the property holders to track the market trends, patrol logs, report the market ups and downs and

[9] Mahlon Apgar, 'What Every Leader Should Know About Real Estate' (*Harvard Business Review*) <https://hbr.org/2009/11/what-every-leader-should-know-about-real-estate> accessed 07 April 2024
[10] *Ibid*
[11] John Ratcliffe, *Urban Planning and Real Estate Development* (2nd edn, Routledge 2003)
[12] Nida Naeem et. al., 'Digital real estate: a review of the technologies and tools transforming the industry and society' (2023) 1(15) Smart Construction and Sustainable Cities <http://dx.doi.org/10.1007/s44268-023-00016-0> accessed 07 April 2024
[12] *Ibid*
[13] 'Industry 4.0 – the opportunities behind the challenge' (*United Nations Industrial Development Organization,* 08 June 2016) <https://www.unido.org/sites/default/files/files/2018-11/UNIDO_GC17_Industry40.pdf> accessed 07 April 2024
[14] *Ibid*

tailor their business strategy accordingly.[15] This in return creates a platform between the homebuyer and the real estate brands to optimize the marketing and sales.

Additionally, PropTech has incorporated certain technologies like Virtual Reality (VR) and Augmented Reality (AR).[16] In addition to the photos and videos, the websites also provide a panoramic image to the buyers by the inclusion of 3D construction of the property. This enables the buyers to have a realistic experience of the property from any corner of the world. The scope for market reach has been widened by the incorporation of such technologies as it not only procures a national audience but also garners the attention of international buyers who are willing to invest in real estate in other countries.[17] Thus, the proliferation of technology has led to a 'strong online presence,' enabling potential buyers and real estate agents to connect through digital property advertising.

In a broader dimension, the use of PropTech is a stride towards sustainability in the real estate market. By providing seamless connections between the buyers and the agents, PropTech seeks to achieve a more accessible and environmentally friendly landscape in the real estate market. Advanced technologies such as 3D Printing, the Internet of Things (IoT) and AI maximize returns for developers' facilities management and optimise site planning.[18] Thus, the environmental impact is significantly minimised reinstating harmonious integration with the local ecosystem and ensuring sustainable growth.

In the Indian scenario, the growth of PropTech is largely attributed to the increasing demand for affordable housing and the Government's focus on digitalisation. However, the COVID-19 pandemic has accelerated the adoption of PropTech on a larger scale. The availability of real estate properties on websites like 99acres and Magic Bricks for the availability of accommodations in commercial properties like dorms and hotels and facilitating transactions for the same are some of the most rudimentary examples for PropTech. According to the reports of the National Real Estate Development Council (NAREDCO), is expected to grow at a rate of

[15] *Ibid*
[16] Bob Thompson, 'Innovation in property management' (2015) 33(4) Journal of Property Investment and Finance <http://dx.doi.org/10.1108/JPIF-05-2015-0027> accessed 07 April 2024
[17] Braesemann (n 7)
[18] *Ibid*

19.58 from 2019-2028.[19] This sector also contributes significantly to the country's GDP. The use of Machine Learning (ML), Artificial Intelligence (AI) and the Internet of Things (IoT), have revolutionised the real estate market in India.[20] However, it entails using a large amount of consumer data, raising concerns about transparency and user privacy.

The enactment of the Digital Personal Data Protection Act 2023[21] has reinforced the aim to safeguard the privacy of individuals. It applies to all organisations that collect and process the personal data of individuals in India. Currently, PropTech companies can analyse large amounts of data from diverse sources by using complex data analytics, thereby, leveraging their dominant position in the market.[22] Consequently, there is a significant increase in threats to user privacy, making it vulnerable to cyber threats.

TURNING THE REAL ESTATE INTO A DATA-DRIVEN MARKET

As argued above, the real estate market is a 'slow moving asset'.[23] The integration of technology in the real estate market has increased efficiency and offered more choices to buyers to explore properties.[24] It creates value for the property's owner and the buyer. The digitalisation of the real estate industry is characterised by online platforms and fractionalised and tokenised living, financing, working, and owning[25]. Smart homes are equipped with many sensors, which help the owners communicate with their smartphones. These innovations increase efficiencies and accessibility. However, the vast quantity of data used by the PropTech firms raises privacy, competition and cyber threat concerns.[26]

---

[19] 'Real Estate' (*Inida Brand Equality Foundation,* 6 September 2020) <https://www.naredco.in/notification/pdfs/IBEFReal-Estate-August-2020.pdf> accessed 07 April 2024

[20] Bernhard Axmann and Harmoko Harmoko, 'Industry 4.0 Readiness Assessment: Comparison of Tools and Introduction of New Tool for SME' (2020) 14(2) Tehnički Glasnik <http://dx.doi.org/10.31803/tg-20200523195016> accessed 07 April 2024

[21] Digital Personal Data Protection Act 2023

[22] Burrows (n 5)

[23] Libby Porter et al., 'Planning, Land and Housing in the Digital Data Revolution/The Politics of Digital Transformations of Housing/Digital Innovations, PropTech and Housing – the View from Melbourne/Digital Housing and Renters: Disrupting the Australian Rental Bond System and Tenant Advocacy/ Prospects for an Intelligent Planning System/ What are the Prospects for a Politically Intelligent Planning System?' (2019) 20(4) Planning Theory and Practice <https://doi.org/10.1080/14649357.2019.1651997> accessed 07 April 2024

[24] Fabian Braesemann and Andrew Baum, 'PropTech: Turning Real Estate Into a Data-Driven Market?' (2020) SSRN <https://dx.doi.org/10.2139/ssrn.3607238> accessed 11 April 2024

[25] *Ibid*

[26] 'Real Estate in the Digital Age: Navigating Privacy and Security Challenges' (*International Real Estate Federation*, 2 October 2023) <https://fiabci.org/en/news-room/view/424> accessed 11 April 2024

As data becomes the main component of such innovations, the incorporation of technology in real estate entails using more consumer data. Data experts and tech evangelists argue that PropTech's use in real estate is making it a data-driven industry.[27] Such markets are largely characterised by the *winner-takes-all-all competition* among the PropTech firms that provide a 'platform business model'.[28] The discreet anomaly that underlies these platforms is that, though it prima facie appears to be a zero-cost offer, they offer digital services to those users that pay them in the form of more user data.[29] This further raises concerns about user privacy and transparency of the PropTech firms.

Secondly, the datafication of the real estate industry has raised concerns about the platformisation of the market. In furtherance of the same, it is hypothesised that PropTech poses potential platformisation concerns over the real estate market.[30] This is further intensified by the growing presence of the big tech companies in the real estate market, raising alarms about the *winner-takes-all dynamics in the market*.[31] These are reflected by the PropTech machinery that uses their domestic market 'that exploit the economies of scale and develop across borders.'[32] Additionally, it has been argued that, as data has become the central resource of the PropTech forms, the use of data in real estate has made it a tradeable commodity.[33] Certain critiques have arisen, specifically concerning the detaching of property information (here it is referred to as online information) which starkly contrasts traditional brick-and-mortar real estate[34]. One of the major concerns arising on such prea mise is that using more data gives a competitive edge to the

[27] Dallas Rogers, *The Geopolitics Of Real Estate: Reconfiguring Property, Capital And Rights* (Rowman & Littlefield Publishers 2016)
[28] Joe Shaw, 'Platform Real Estate: theory and practice of new urban real estate markets' (2018) 41(8) Urban Geography <https://doi.org/10.1080/02723638.2018.1524653> accessed 11 April 2024
[29] Burrows (n 5)
[30] Julie Smith et al., 'Tokenized Securities and Commercial Real Estate' (2019) SSRN <https://dx.doi.org/10.2139/ssrn.3438286> accessed 11 April 2024
[31] Rob Kitchin, 'The real-time city? Big data and smart urbanism' (2014) 79(1) GeoJournal <https://www.jstor.org/stable/24432611> accessed 11 April 2024
[32] Saskia Sassen, 'Interactions Of The Technical And The Social' (2012) 15(4) Information, Communication & Society <https://doi.org/10.1080/1369118X.2012.667912> accessed 11 April 2024
[33] Geoff Boeing, 'Online Rental Housing Market Representation and the Digital Reproduction of Urban Inequality' (2019) SSRN <https://dx.doi.org/10.2139/ssrn.3419532> accessed 11 April 2024
[34] Steven Maarbani, 'Real Estate Technology Threat or Opportunity?' (*Real Tech*, 16 May 2017) <https://maarbaniconsulting.com/wp-content/uploads/2017/07/real-estate-technology-white-paper-kpmg-realtech-ventures.pdf> accessed 11 April 2024

PropTech firms.[35] It enables them to leverage their dominant position in the market, displacing the less competitive firms.

The use of data in real estate in India began in early 2005. Firms such as 99 Acres and Magic Bricks are among the first internet-based PropTech models. They used the vast consumer data to identify demand patterns and market trends. This enables them to harness predictive analytics and determine an optimal price for the property to attract potential tenants or buyers.[36] Furthermore, the demand trends also forecast the market conditions in the future and enable investors to stay ahead of the curve. The analytic algorithms use the data to identify and mitigate potential risks.[37] While all these generate a net benefit for the buyers and the owners to make informed decisions, it has a broader network effect and form the main reason for the disruption of competition in the real estate market.

Lastly, owing to the increasing reliance of the PropTech firm on technology to store and transfer sensitive data, cyber security threats generate a significant risk.[38] The PropTech companies, collect, store and process the sensitive client data. This makes the user data vulnerable to phishing attacks involving fake websites, messages, and emails, which trick users into giving away their personal and financial information.[39] Furthermore, the high-value monetary transactions via the PropTech platforms have become a 'compelling target' for hackers and attackers.[40] PropTech firms often collaborate with numerous third-party service providers, ranging from financial institutions to various property management systems.[41] The inadequate cyber security control apparatus introduces further cyber risks. The lack of interoperability and standardisation poses challenges for the operators of the PropTech platforms in regulating and

---

[35] Zhengzhen Tan and Norm G. Miller, 'Connecting Digitalization and Sustainability: Proptech in the Real Estate Operations and Management' (2023) 15(1) Journal of Sustainable Real Estate <https://doi.org/10.1080/19498276.2023.2203292> accessed 11 April 2024

[36] *Ibid*

[37] Ritika Gondhalekar, 'Metaverse In Real Estate: A Game-Changing Concept' *Times Property* (17 January 2024) <https://timesproperty.com/news/post/metaverse-in-real-estate-a-game-changing-concept-blid6525?offset=1> accessed 10 April 2024

[38] Kirsten Doyle, 'The Looming Cyber Threat in Real Estate' (*Trip Wire*, 25 March 2024) <https://www.tripwire.com/state-of-security/looming-cyber-threat-real-estate#:~:text=Moreover%2C%20with%20the%20proliferation%20of,tenants%2C%20clients%2C%20and%20stakeholders> accessed 11 April 2024

[39] *Ibid*

[40] Industry 4.0 – the opportunities behind the challenge (n 13)

[41] Tan (n 35)

controlling the looming cyber threats.[42] Thus, the fallout from a cyber breach can be detrimental if not addressed efficiently. While the application of PropTech mechanisms effectuates growth in the real estate industry, the use of technologies, however, also introduces newer vulnerabilities in the context of cyber threat, competitiveness and user privacy.

DELVING INTO THE INTRICACIES OF THE RELATIONSHIP BETWEEN PROPTECH AND DATA PRIVACY

There has been a revolutionary pace of growth in the property market through the application of PropTech, thus antithetical to its traditional system of management models. The use of tools such as Geographic Information Systems [GIS], the Internet of Things [IoT], and Artificial Intelligence [AI] have fundamentally paved the way for an innately new domain of real estate.[43] An essential element for facilitating PropTech is geospatial data, which facilitates a comprehensive assessment of potential benefits with respect to the location of the place, thus allowing a medium for predicting market trends.[44] The idea of 'smart homes' has also been introduced through PropTech; the latter, by applying IoT, aims to improve the occupants' comfort through its efficient energy-saving objective.[45] Thus, PropTech facilitates in achievement of goals concerning sustainable development.

However, the flip side of technological advancements lies in stark contrast to the myriad perks provided by the former, with contravention of a user's privacy being the prominent reason for the same. This thereafter opens doors to various ambiguities concerning the scope of using technology in property management and data privacy breaches.

To vitiate the latter, a detailed understanding of the paradigm relation between privacy responsibilities and the benefits derived from technological advancements must be understood. Thus, the potential implications, ethical, legal and otherwise, occurring due to the same, have to be assessed by all key players in the domain. The domain of real estate is currently being hit by

---

[42] *Ibid*

[43] Francisco Trincado Munoz, et. al., 'Digital transformation in the world city networks' advanced producer services complex: A technology space analysis' (2023) 151(5) <http://dx.doi.org/10.1016/j.geoforum.2023.103721> accessed 11 April 2024

[44] Dorota Benduch, 'New Technologies In Real Estate Management And Protection Of Privacy' (2023) 3(1) GIS Odyssey Journal <https://doi.org/10.57599/gisoj.2023.3.1.149> accessed 11 April 2024

[45] *Ibid*

an intense wave of digitalisation, and PropTech lies at the heart of the transformation. PropTech, in simpler words, is defined as '*the broad application of innovative technologies in the real estate sector*,' and under its ambit, the former encompasses drones, building information models, IoT, AI, blockchain, virtual reality, and data analytics, among others.[46] The use of such innovative technologies paves the path for efficient energy-saving strategies and preservation of the environment, thus allowing the progress of countries to be in line with sustainable development goals; i.e., Agenda 2030.[47] The real estate domain has now fostered a new path of technification. It is posited that PropTech *is central to the future of property management*.[48]

With this as the premise, it becomes evident that technology, including the internet, plays a pivotal role in the digitalisation of the property management domain[49]. An in-efficient usage of the same however poses grave concerns, with age-old tactics for ensuring privacy now being obsolete. There have been several instances concerning privacy breaches thereby gravitating to the need to protect the said right[50].

THE SOPHISTRIES OF 'SAFE' TECHNOLOGICAL INTEGRATION IN THE REAL ESTATE DOMAIN

Presently, the digitalisation of the real estate domain is occurring at a *breakneck* speed. An analysis of the megatrends of PropTech, as previously dealt with, evidentially leads to two major concerns; data privacy and security.[51] A superficial glance at PropTech also conclusively necessitates addressing the concerns of breach of privacy. A basic instance of the same is transactions that occur in real estate, which involve significant bulk money and personal information [address, social security number, account number and more] being stored in the digital realm. The commercial and residential sectors are now being equipped with sensors and similar surveillance apps that continually monitor user behaviour and preferences.[52]

---

[46] Jathan Sadowski, *Too Smart: How Digital Capitalism is Extracting Data, Controlling Our Lives, and Taking Over the World* (MIT Press 2020)
[47] *Ibid*
[48] Andrew Baum, *PropTech 3.0: The future of Real Estate* (University of Oxford Research 2017)
[49] Benduch (n 44)
[50] *Ibid*
[51] Angelica Krystle Donati, 'This is what Real Estate and PropTech should be doing to protect your data' (*Forbes*, 28 March 2020) <https://www.forbes.com/sites/angelicakrystledonati/2020/03/28/this-is-what-real-estate-and-proptech-should-be-doing-to-protect-your-data/?sh=14485a496797> accessed 10 April 2024
[52] *Ibid*

With the real estate domain dealing with a 'more-than-usual' transaction amount, breaches in its data and privacy lead to costly consequences[53]. It is pertinent to note that the same isn't a mere IT concern, but rather a significant business risk. The increased applicability of IoT devices paves the path of numerous entry points to hinder building infrastructure, and its ecosystem and lead to a ransomware demand among other significant safety concerns.[54]

The transformative changes occurring due to AI have only furthered such concerns, as the former is responsible for processing several private data. Integrating AI in the real estate domain, through *smart-home* systems that facilitate occupant comfort through remote control and monitoring systems, leads to a confounding set of dilemmas concerning security and privacy breaches.[55] Furthermore, such surveillance technologies also store genetic and biometric data of their occupants, thus encompassing an ever-growing field of concerns in breach of private data.[56] Reliance on the publication by the *European Union Cyber Security Agency* details the gravity of vulnerabilities that arise from relinquishing control to AI-driven home tools such as smart locks or thermostats[57]. Thus, *smart homes* are easily prone to thefts and grave burglaries that could occur by merely hacking the devices that are in existence to prevent the latter.[58]

Being a rather niche field, the networking system in the real estate domain is quite superfluous. Such unprotected networking systems fall at the mercy of several malicious cyber operatives from around the world. The premise of such concerns stems from the tool of Building Management System [BMS], which forms the *staging point* for such grave breaches.[59] Such an issue is now no longer an academic rhetoric; rather, breaches of such privacy have occurred leading to significant disquietude in the relationship between PropTech and the Real estate

[53] Edward Farelly, 'Proptech in Real Estate: Opportunity or Threat' (*Marsh*, 7 December 2020) <https://www.marsh.com/in/industries/real-estate/insights/proptech-in-real-estate-opportunity-or-threat.html> accessed 10 April 2024
[54] *Ibid*
[55] Benduch (n 44)
[56] Apgar (n 9)
[57] Industry 4.0 – the opportunities behind the challenge (n 13)
[58] *Ibid*
[59] Michat Gqsior, 'Privacy and Security: PropTech in the Golden Age of Hacking' (*Zonifero*, 22 October 2019) <https://zonifero.com/en/blog/proptech/privacy-and-security-proptech> accessed 4 April 2024

domain. To emphasize the gravity of the instance, the following instances would shed light on the need to pay heed to concerns of privacy breach[60];

[1] *The Building Management System [BMS] Privacy breach at Google [Australia]*

Two IT researchers significantly compromised the BMS of the Google office, headquartered in Australia, and were consequently able to access complete control over the office's LAN Diagrams, blueprint of the basement and roof, alarms, and water pipe temperatures, thus showcasing the various methods of adversely manipulating the system. While in this particular instance, the researchers were 'white-hat' hackers thus negating any malicious intent, the event led to several academic debates by IT professionals headquartered in the office with respect to its superfluous security over its property management domain[61].

[2] *The breach of the Point of Sale [POS] System at Target [United States of America]*

By merely hacking the 'Heating Ventilation and Air Conditioning System' of Target, Latvian Hackers were able to install malicious malware in the system of the retail shop, which resulted in the theft of email addresses, credit card numbers, later expiration dates, among others, of almost 70 million customers.[62]

[3] *The cyber-attack on the power grid system of Ukraine*

In 2015, three companies that were involved in energy distribution fell vulnerable to a cyberattack that occurred by hacking the BMS of the building, thus impeding the power supply to over 230,000 citizens of the country. The nature of the breach was of such a grave nature, that resulted in the latter being reactivated only through manual technification.[63]

Thus, it is evident that while the adoption of PropTech into the real estate domain adds a new dimension of exacerbated growth in the field, the intricacies of their integration have led a

---

[60] *Ibid*
[61] Ben Grubb, 'Australian Google Office Building hacked' *The Sunday Morning Herald* (07 May 2013) <https://www.smh.com.au/technology/australian-google-office-building-hacked-20130507-2j416.html> accessed 10 April 2024
[62] Rithvik V Gopal, 'Complete Case Study – Target Data Breach' (*Medium*, 04 December 2022) <https://medium.com/@rithikvgopal/complete-case-study-target-data-breach-2-ba4bb365a82e> accessed 06 April 2024
[63] 'Compromise of a power grid in Eastern Ukraine' (*Council on Foreign Relations*) <https://www.cfr.org/cyber-operations/compromise-power-grid-eastern-ukraine> accessed 06 April 2024

frontier gateway to a plethora of data breach concerns. No longer a mere academically-driven debate, such concerns are to be explicitly dealt with in order to facilitate the various gateways technology would open in the domain of real estate.

The gravity of the same has gained traction on a global scale too. On an international footing, the importance of safeguarding privacy rights are enshrined in several instruments such as the *International Covenant on Civil and Political Rights, 1966 [ICCPR],* the *European Convention on Human Rights, 1950 [ECHR]* and the *Universal Declaration of Human Rights, 1948 [UDHR].*[64] Furthermore, the European Court of Human Rights explicitly enunciates the necessity to institute safeguards for private data, especially with respect to the current dawn of a digitalised world.[65] Thus, with the international protection afforded to the right to privacy, any acts in contravention of the same would therein be considered unlawful. For instance, Article 8 of the ECHR states that: "…*everyone has the right to respect for his private and family life, his home and his correspondence...*"[66]

Thus, the material ambit of the same corresponds to a '*private life and family life*', '*home*' and '*correspondence*' and is thereafter inextricably linked to the present matter of breaches in privacy by PropTech in the real estate sector. The same has been paralleled in the Polish Constitution. Thus, it has been outlined that the occurrence of privacy violations in real estate is encompassed within such international instruments. Some instances of the same include surveillance technology used in PropTech, as the former impedes the privacy of surrounding neighbours[67]. The ambit is furthered by the dearth of stringent networking to safeguard its protocols as the same would be prone to hacking and thus impede the autonomy of the occupant too.[68]

[64] Benduch (n 44)
[65] *Ibid*
[66] European Court of Human Rights, 'Guide on Article 8 of the European Convention on Human Rights' (*Equality and Human Rights Commission,* 31 August 2022) <https://www.equalityhumanrights.com/human-rights/human-rights-act/article-8-respect-your-private-and-family-life#> accessed 07 April 2024
[67] Benduch (n 44)
[68] *Ibid*

NULLIFYING THE PARALOGISM OF PROPTECH LEGISLATION IN THE REALM OF REAL ESTATE

With regard to the complexity of the real estate domain, the major challenge presently is to mitigate a framework that could implement efficient data-protection methods into the operating system. The advent of the digital era has paved the way for the sector of real estate to no longer remain a niche area, with investors and various stakeholders expecting an increased adoption of technology to facilitate a wider reach on the commercial and residential aspects of real estate.[69] There however exists basic issues in Real Estate such as a dearth of expertise and technical know-how, insufficient hardware measures, and a lack of digital regulatory mechanisms, among others[70]. Achieving compliance in the sphere of PropTech is thus the need of the hour, and the same requires a stable foundation, an intricate and precise plan, along strict adherence to the same. The cornerstone for achieving the same is the implementation of a framework of legislation, that is *iron-clad* and tailor-made to the intricacies of that particular sphere. Therefore, certain policy recommendations are therein promulgated, that aim to strike a balance between consumer interest and safeguarding the innovative business models of the real estate industry.

[1] *The institution of a robust Data-Security framework*[71]

In the dynamism of real estate, every digital interaction poses a vulnerable threat at its end, thus making such an implementation imperative presently. A prominent method to facilitate the same is through a combination of the following measures that would encompass a supervisory framework of legislation;

- Measures for encryption of any sensitive or private data;
- Implementation of stringent controls concerning access to the PropTech tool;
- Inculcating reviews and audits in a periodical manner.[72]

[69] Donati (n 51)
[70] *Ibid*
[71] Benduch (n 44)
[72] Porter (n 23)

[2] *Regulating awareness and training among those employed in PropTech*[73]

The human element in facilitating and mitigating cyber threats is never overstated; a well-trained team becomes the strongest asset in effectuating security protocols in times of threat and otherwise. Thus, the following must be taken into consideration;

- Safety protocols are to be *second nature* among the employees;[74]
- Fostering a culture that facilitates regular training sessions that allow the employees to familiarise themselves with the various new dimensions of PropTech and the threats it poses.
- Create simulations of various scenarios, of possible threats thus allowing the employees to hone their skills.

[3] *Identification of possible cyber threats and consequently creating of likely-loss scenarios*

[4] *Instituting a 2-factor authentication protocol*

[5] *Regularising security-based audits in a stringent method*

CONCLUSION

The dynamism of real estate in a traditional setup has been a slow-moving asset in adapting to evolving changes. However, the digitalisation of real estate has transformed it into a new domain, having changed the fabric of its technicalities. The integration of technology in real estate has created a broader market for buyers and sellers to have a customised experience from the comforts of their homes. While the present contribution deals with the concept of 'Datafied Markets' in the real estate sector and its privacy implications, it creates a broader scope to delve into the intricacies of the datafication of the real estate market, and competition in the market. This is implicit from the significant challenges posed by the interplay between PropTech firms and Big Tech, which has posed competition concerns in the real estate market. The commodification and monopoly over consumer data enable the PropTech platforms to leverage their dominant position in the market by creating network effects and 'winner takes all dynamics'. While such conduct has negative implications for competition, it takes a toll on the

[73] Braesemann (n 24)
[74] *Ibid*

user's privacy in a broader context. Furthermore, the looming cyber security threats amplify the risk of user data breaches. Thus, a robust cybersecurity measure must be tailored to address the challenges in a digital ecosystem proactively.

The digital shift has further led to the processing of large amounts of private data, and the application of such contemporary technologies has opened doors to a multitude of concerns regarding breaches in data privacy. The legality of the same has been comprehensively dealt with, by paralleling such legislation at domestic and at an international scale. A juxtaposed reading of various countries' legislative frameworks showcases the dearth of understanding the intricacies and vulnerabilities of the impact data breaches have in the realm of real estate. Presently, legal architecture concerning the same is superficial in its method of tackling the issues therein arising and is thus ill-equipped to resolve the complexities of PropTech technologies. Thus, despite the myriads of benefits bestowed by the *digital metamorphosis* of PropTech, it is the need of the hour to understand the latter's implication for an individual's privacy. Thus, the digitalisation of the real estate sector poses two pathways – a trove of a plethora of valuable opportunities, coupled with its cauldron of concerns and impediments.