International Journal of Scientific Research in Computer Science, Engineering and Information Technology
ISSN : 2456-3307 (www.ijsrcseit.com)
doi : https://doi.org/10.32628/IJSRCSEIT

Digital Transformation on Real Estate Industry Growth with Big Data

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Article Info
Volume 8, Issue 5
Page Number: 85-92

Publication Issue :
September-October-2021

Article History
Accepted : 02 Oct 2021
Published : 26 Oct 2021

ABSTRACT

The real estate industry is currently undergoing a digital transformation that not only changes its nature in terms of the markets and work environments, but is also influencing its growth. What are the main trends and concerns related to this transformation? To what extent is the real estate industry already prepared for this? This paper reviews the situation in terms of the emergence of a phenomenon known as PropTech. PropTech is characterized by the massive implementation of emerging technology such as home matching tools, drones, virtual reality, building information modelling (BIM), data analytics tools, artificial intelligence (AI), Internet of Things (IoT) and blockchain, smart contracts, crowdfunding in the real estate sector, fintechs related to real estate, smart cities, regions, smart homes and shared economy. This survey of changes in the real estate industry due to PropTech covers four areas: (1) PropTech applications in the real estate industry; (2) implications of PropTech for real estate market transparency; (3) how PropTech could give a region or a company a competitive advantage; and (4) concerns on the wider implications of these changes on a labour market and education. In a plausible scenario, changing the real estate technologies could change system dynamics and improve real estate market transparency. Moreover, it can be asserted that, in a broader sense, PropTech is beneficial for territorial competition and territorial growth strategies. And lastly, under different institutional arrangements, PropTech can affect the changing structure of the real estate market, the demand for hi-tech, new skills as well as emerging policy challenges for the real estate industry.
Keywords:- Real Estate, Big Data, Industry Growth

I. INTRODUCTION

Real estate and construction are important sectors in the economy. They both employ large amounts of capital and significant proportions of the workforce. Furthermore, together with other fields such as health, transportation, trade, agriculture, and so forth, real estate and construction have been targets of digital transformation. In the era of smart sustainable development and growth [1], companies

are interested in solutions that allow their processes, machines, employees, and even the products and services themselves, to be integrated into a single integrated network for data collection, data analysis, the evaluation of company development, and performance improvement. Staying smart, sustainable and inclusive in today‟s global business environment requires continuous improvement in productivity, quality, agility, and service levels [2]. Apart from the obvious benefits for firms, benefits from this turn also accrue to territorial governance, notably city management. PropTech is defined as massive implementation of emerging technology within the real estate sector. A non-exhaustive list of such technologies include home matching tools, drones, virtual reality, building information modelling (BIM), data analytics tools, artificial intelligence (AI), Internet of Things (IoT) and blockchain, smart contracts, crowdfunding in the real estate sector, financial technologies (fintechs) related to real estate, smart cities and regions, smart homes, and shared economy. All these relatively recent innovations have the potential to improve productivity and competitiveness, increase energy and resource efficiency and effectiveness and hence to protect the environment and provide opportunities for developed and developing countries to achieve economic growth and sustainable development in line with the 2030 Agenda for Sustainable Development [3]. Property is at the heart of a „smart‟ territory and it is time for the real estate industry to take a leading role. Moreover, it is likely that also territorial competition and territorial growth would benefit from the implementation of PropTech solutions. The concept of «PropTech 3.0: future real estate" was developed in 2017 at the Oxford University School of business, the United Kingdom [4]. Subsequently, PropTech became part of the digital transformation of the real estate industry, in terms of leading the market and promoting a radically new approach to the acquisition, operation and management of the real estate. PropTech is furthermore a collective term used for the determination of start-ups that offer technologically innovative products and new business models for the real estate markets. PropTech means any application in the real estate sector, be it 3D visualizing, home matching tools, crowdfunding, fintechs, shared economy, smart cities, smart homes, AI, smart contracts or BIM. PropTech is still and a new trend, the scale of which will grow up over the time. Therefore, currently PropTech is developing in several areas: the real estate market as its own (PropTech in the narrowest sense), smart cities and buildings, the sharing economy, the construction industry (i.e. ConTech) and finance (thus, fintechs). The remainder of our review discusses first the major features of PropTech in itself (although, in this context, understood in a broader sense than merely boundaries of a given plot or building). After that we review the current development trends, and the main opportunities and challenges of PropTech through the prism of the real estate sector. In doing so, we focus here on three kinds of implications: (1) market transparency; (2) territorial competition and (3) workplace environment. Lastly we note a number of conclusions based on these issues.

II. REAL ESTATE AND DIGITAL TRANSFORMATION

Realistically, few businesses can escape the digital transformation taking place across the global economy, and the real estate sector is no exception. Real estate companies are already using PropTech to improve customer experiences, boost sales and increase operational efficiencies. Yet many real estate firms have been slow to keep up with adopting new tools and technologies to transform their companies. The following list identifies examples of what real estate companies can do to embrace digital transformation for long-term success [5]:

- Use of rich media visualization to improve customer experiences.
- Collect property data with IOT devices.

- Embrace BIM.
- Employ AI-powered data analytics for transformative insights.
- Streamline workflows with digital image classification and similar procedures. World Economic Forum classified the PropTech sector into three major categories [6]:
- PropTech 1.0: Growth of online listing sites back in 2007.
- PropTech 2.0: Use of data analytics and virtual reality to offer better and more specialised services for customers.

PropTech 3.0: Experimentation with emerging technology such as drones, virtual reality tools, IoT and blockchain which are observing in recent days. Nowadays almost 50 countries have created national communities and these have already been united in a single network. Furthermore, the PropTech community has a number of interesting features. It is organized exclusively by business and for business. The community generates B2B services without any government involvement. What is the unusual, they include companies from various fields: investors (i.e. institutional and private equity funds, banks and financial groups, venture capital funds, business angels), real estate market participants (i.e. rights holders property developers, builders, consulting and brokerage companies, valuers, management and insurance companies), and technological IT – companies (i.e. suppliers of IT -solutions, integrators, aggregators , developers of specialized cloud and mobile applications), and start-ups (i.e. developers of technology products and solutions in the field of real estate). The community systematically holds international symposiums, seminars, and competitions that influence the generation of new projects. A certain methodology to identify unoccupied PropTech niches already exists, in order to initiate start-up projects in them. Throughout this purpose, national maps of fintechs and PropTech are developed. They are designed to get an idea of which ICT tools in the country's real estate market are well developed, which are bad, and which are not developed at all. The map is based on open sources, includes information about the PropTech community, about IT companies, their projects in the problem areas of PropTech, about PropTech-developments, about PropTech-projects of banks, about developers, about real estate managers, and about other real estate market participants. The market map of PropTech (Market Map) gives the most complete picture in which the parameters of the market have a visible development, about the potential and the level of competition. Market map has information about all market players consolidated and classified by a certain attribute: competitors, intermediaries and sellers. The map certainly includes an image in the form of the layout of the logos of its participants. The classification of participants depends on their position in the global and national markets and their role in marketing activities. The map shows how the company's roles in market distribution and allows to evaluate the place of individual firms compared to competitors. The creation of such a map is considered today as the final stage of marketing research on the real estate market.

Table 1: Structure of start-up projects at the PropTechRiga2019 competition

Name of a start-up project	The company, the country	Class of a platform
1. Construction processes synchronization platform based on BIM	BIMSynch (Latvia)	Construction Management
2. A platform for property managing and operating	ODN (Russia)	Facility Management
3. A corporate platform for day-to-day construction management	OROCON (Latvia)	Construction Management
4. Office Management Platform	Pingin (Lithuania)	Property Management, Short-Term Rental / Vacation Search,
5. Business Process Platform for Return Reinvestment	Profitus (Lithuania)	Portfolio Management
6. Smart Contract Real Estate Transaction Automation Platform	SmartLaws (Latvia), Agent House (United Kingdom),	Real Estate Agent Tools
7. SaaS Platform for Sales Synchronization and Tendering services for a variety of companies and suppliers	FIXtender (Latvia),	Portfolio Management
8. Analytical GIS platform with many B2B services	Einpix (Lithuania)	Home Services
9. Cloud portfolio platform for home developers	REALPAD Software (Czech Republic)	Portfolio Management
10. Blockchain platform for cross-border housing transactions	Velvet (Estonia)	Long-Term Rentals / Sale Search
11. Real Estate Portfolio Platform supported by Realtors and Crowdfunding	Reinvest24 (Estonia)	Portfolio Management

Analysis of PropTech solutions, including those submitted for the PropTechRiga2019 competition shows that the business models of all the submitted

start-up projects are global. Therefore, they are designed for users of the whole world, or Europe, or several regions, but not for a single country. As the allocation of venture capital funding by an increasing band of global investors is deployed to uncovering and developing the digital innovation of the future, traditional operators will come under increasing pressure to adapt or perish. One of the features of this „survival game" undoubtedly pertains to the way market information is made accessible and maintained for any user or investor category dealing with real estate.

III. REAL ESTATE MARKET TRANSPARENCY

Real estate market transparency entails the incorporation of the objectives of smart sustainable development and growth into industry and government operational practices and plays a crucial role in a city's success. It enables governments and public bodies to function effectively, providing long-run benefits to local communities and the environment. It also helps in creating a more competitive and flexible environment for investments and businesses, as well as contributing to improvements in quality of life for citizens. Without high levels of transparency, real estate markets cannot work efficiently. Four key issues, with significant implications for transparency, stand out here:

- The emergences of the PropTech sector, as new technologies are adopted by the industry.
- The rise of „flexible office space", as major disruptors change real estate market dynamics.
- The spotlight on beneficial ownership and anti-money laundering, as public debates around corruption, tax evasion and ownership continue to make headlines.
- The maturing of the „alternatives" sector, as it goes mainstream and investors demand higher transparency.

The first item is one of the most important. In this new age, digital technology has already become the defining transformational force. It has rapidly become an umbrella concept for the central new drivers of productivity growth, innovation and the diffusion of knowledge on a global scale. Those who embrace digital technologies as the central transformational force of this new age are likely to prosper. While digital transformation has disrupted almost every type of business, the real estate industry has been traditionally slow to move with the times. Why is it so? Reasons have to do with speculation, when better yields and profits can be extracted without innovating; another reason is conservative attitudes. We must remember that we are dealing with a particularly durable good. In general, we can refer to a rather constrained decision making setting of any real estate sector or subfield [10].

In 2018 the demand for higher transparency was stronger than ever, as investors continued to increase their allocations to the sector, public debates around property ownership continued and the industry grapples with significant structural changes. Over the past two decades, the Global Real Estate Transparency Index has become established as the leading industry benchmark for assessing market transparency. Now in its tenth iteration, it continues to guide the sector towards higher standards. The survey also reveals that the landscape of transparency is shifting, with new issues emerging on the horizon as the real estate Sector undergoes unprecedented structural change. Another Real Estate Environmental Sustainability (REES) Transparency Index is based on a survey completed by JLL Energy and Sustainability Services experts in every 100 countries. Canada has joined France, Australia, Japan and the UK in the „Highly Transparent" group in 2018, while Belarus has still sheared the „Opaque" group with Kazakhstan, Uruguay, Kuwait, Panama, Ukraine and others. Low REES Transparency has Slovenia, Turkey, Bulgaria, Serbia, Hungary, Saudi

Arabia, Egypt, Iran, Lebanon and some other countries. To sum up the discussion above, real estate transparency and environmental sustainability market transparency entails the incorporation of the objectives of smart sustainable development and growth, digital and investment performance, into the operational practices of government and industries.

IV. PROPTECH AND WORKFORCE AND EDUCATION

So PropTech is the profound transformation of business and organizational activities, processes, competencies and models. Those who thrive in the PropTech will need to develop and execute a vision for digital transformation take an ecosystem-first approach to delivering products and services, manage information effectively, optimize business processes for speed, efficiency, quality, and agility, create flexible and reliable human resource model. Three types of impact on the labour market are obvious: (1) the labour market is shrinking, (2) the labour market is not changing, but is improving, (3) new niches are emerging in the labour market. As the tendency of ICT industry is to concentrate, all such development is not necessarily positive. Practical examples, such as Airbnb, WeWork and Amazon demonstrate how digital disruptors can materially affect the markets in which they operate, leaving incumbents scrambling to catch up. Potential problems with such global monopolists can also be observed. More than anecdotal evidence already exists on this. Examples include Amazon blocking potential publishers and Air Bnb barring potential guests with different political views than the left-of-centre or liberal norms. For example, the labour market of valuers is reduced by the platform «FinCase» (https://f-case.ru), a project developed in Russia, which can be attributed to the class of Portfolio Management. The platform offers the FinCase Scoring Value Analysis System solution – a solution for the automatic valuation of real estate, which allows automata of the valuation and forecast of the value of both residential and non-residential real estate. In fact, the phenomenon of labour market contraction entails any decision based on AI technologies. Thus, BIMSynch (Latvia) delivered a start-up project in Riga with the digital construction platform “BiM Building Synchronization Platform”, construction management class. The project proposes an IT- platform for managing construction processes under the “guidance” of BIM and a mobile application that allows comparing the real state of the construction object with its model. The platform will provide users with savings in time and money by optimizing the cost of a construction, improving synchronization of joint actions of subcontractors, improving copyright supervision, and construction monitoring processes, quality real estate management while reducing the number of employees. PropTech is also driving growth in the labour market but in completely new segments. For example, the development of digital real estate marketing leads to the growth of the labour market for specialists in the creation of digital twins of virtual and augmented reality (3D-VR), operators of multi-level earth remote sensing systems, specialists in indoor mapping, facilitators in using IoT. Companies in leading sectors have workforces that are 13 times more digitally engaged than the rest of the economy. In lagging sectors, the digital engagement of the workforce can be erratic; some organizations have made progress in certain areas but have not yet addressed foundational tasks their workers perform.

Another example is the project of the Velvet (Estonia) company. Name of the project: The Blockchain is the platform of cross-border housing transactions. The platform solves the problem of remote authentication of civil law subjects, the design and implementation of e-transactions, communication with payment systems, and so forth. Its regulations allow all interested parties in transactions to identify themselves and make decisions based on big data (in this case: the list of sanctions, information on criminal offences) to ensure the fact of cooperation with the

proper person. The regulations provide the necessary level of transparency, when customers can see at what level of transaction they have: the payment was made, the payment was accepted; the transaction was done, and so forth. Regulations of the platform provide an immutable record, when the terms of the transaction cannot be changed under any circumstances, while maintaining a high level of security and confidence to all types of transactions. Regulations of the platform have everything for the execution of transactions that provide interaction platforms for worldwide interbank financial SWIFT messaging for payments with escrow accounts (platforms). Velvet implements transaction of purchase/sale with a high degree of security regardless of the geographic location of the property and civil rights. Possible areas of use of the platform: logistics, ECommerce, real estate, stocks, and so forth. The top of the countries in the implementation of the project are Ukraine, Germany, Russia, Finland and Turkey. This project is unique for the simple reason that never before was not used smart contracts, blockchain and token in real estate transactions by this way.

This phenomenon was envisaged by the PropTech concept, which introduced the concept of „separation economy" into practice. Coworking (Co-working, „teamwork") is becoming a new approach to organizing the work of people with different occupations in a common space. Coworking space is often called a shared space, a collective office. Coworking characterizes the flexible organization of the workspace and the demand form communities. Coworking space is referred to as the „third place", separate from two ordinary social environments: home („first place") and workplace („second place"). Examples of third places are often shown as environments such as cafes, clubs, public libraries, parks, shared offices, and so forth. According to Jones Lang LaSalle (2016), 25% of average working time is currently spent in the third places. Dennis Frenchman from the Massachusetts Institute of Technology proposed the term „fractionation of real estate" to describe the fragmented use of inefficiently-used space of the same real estate. Fractionated real estate becomes a workspace sharing platform. Projects of the Short-Term Rental / Vacation Search class have already been implemented, allowing to become the owner of the office on the principles of coworking for several hours from the moment of a contact. The demand for joint workspace is caused by the growth of creative and technical industries, as well as a change in the nature of work. The number of collaborators that have been used coworking is growing steadily from year to year and, according to current estimates, reached 1 million participants in 2017.

The definition of big data is data that contains greater variety, arriving in increasing volumes and with more velocity. Put simply, big data is larger, more complex data sets, especially from new data sources. These data sets are so voluminous that traditional data processing software just can't manage them. But these massive volumes of data can be used to address business problems you wouldn't have been able to tackle before.

V. CONCLUSION

PropTech can be seen as a new battleground in real estate. Global technology entrepreneurs and investors have already begun turning their attention to reinventing the real estate sector, through business model innovation and product innovation. Companies are using PropTech to raise the bar in operational efficiency, customer engagement, innovation, and workforce productivity. The general impact of PropTech on the labour market is a more complex issue than the impact on real estate and built environment alone. The results are expected to be mixed: one the one hand, widespread dislocation of workers, and possibly unjust treatment of dissident voices by global monopolists, but on the other, a

proliferation of PropTech that offer new, potentially more flexible ways of working, education, matching skills, and acquiring skills. So at the same time two opposite trends emerge: one, harm caused by movement of unskilled labour force (possibly together with over-abundant skilled labour force), from low-income countries towards high-income countries, where their arrival, in the absence of strong unions, will lead to a race towards bottom in the local labour market; two, for those who are in the market for high level technology and management oriented roles, a convenient fit between demand and supply for such jobs (controlling of BIM process, moderation of AI and so forth).

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Cite this article as :

Tanmayee Tushar Parbat, Rohan Benhal, Honey Jain, Dr. Lalit Kulkarni, "Digital Transformation on Real Estate Industry Growth with Big Data", International Journal of Scientific Research in Computer Science, Engineering and Information Technology (IJSRCSEIT), ISSN : 2456-3307, Volume 8 Issue 5, pp. 85-92, September-October 2021.

Journal URL : https://ijsrcseit.com/CSEIT217679