

## MODERN TECHNOLOGIES (PROPTECH) IN RENTAL HOUSING FROM THE PERSPECTIVE OF YOUNG PEOPLE – A CASE STUDY OF THE LOCAL REAL ESTATE MARKET IN POZNAŃ

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**Purpose:** The purpose of the study is to assess the expectations of young people on the use of modern technologies in rental apartments and their interest in properties equipped with such technologies.

**Design/methodology/approach:** The study was a continuation of research that was conducted by the authors of the paper as part of a research team on the topic of the use of modern technologies in the residential real estate market. The previous research was conducted in 2021 among potential home buyers and concerned perceptions of modern technologies in the context of purchasing an apartment. The results presented below refer to the survey, which was conducted in 3 months - April-June - 2024. An internet questionnaire was used as a research tool, the subjects were young people (up to 25 years of age) from the area of Poznań (non-random sample selection, sample size n = 369).

**Findings:** Based on the research, it can be concluded that owners of apartments for rent should consider the use of modern technologies primarily in terms of increasing the energy efficiency of apartments and increasing the security of tenants. On the other hand, modern technologies in an apartment are a source of a sense of prestige for tenants, for which they are willing to pay more.

**Research limitations/implications:** The study is limited to Poznań, a specific local real estate market. Findings may not be generalizable to other cities or regions with different economic conditions, cultural preferences, and technological adoption rates. Identifying the limitations of this study highlights areas for future research, such as expanding the geographical scope, exploring different demographic groups, and examining long-term trends in PropTech adoption in rental housing.

**Practical implications:** Understanding young customers' expectations regarding PropTech can help developers and property managers design and market rental apartments more effectively. Incorporating desired technologies can enhance tenant satisfaction and retention. The findings can guide tech companies and startups in the proptech sector to focus on innovations that meet the specific needs and preferences of young renters in local markets like Poznań. Real estate investors can use the study's insights to make informed decisions about investing in properties with advanced technological features, potentially leading to higher returns by meeting market demand.

**Social implications:** The research can raise awareness among the general public about the benefits and possibilities of modern technologies in rental apartments. This increased awareness may lead to greater acceptance and demand for tech-enhanced living environments. The integration of PropTech in rental apartments often includes energy-efficient systems, smart home devices that reduce waste, and technologies that monitor and optimize resource use. This can promote more sustainable living practices and reduce the environmental footprint of residential buildings.

**Originality/value:** The survey is part of a worldwide discussion on the implementation of modern technologies in the housing market. The rental market in this regard is the least studied area especially from the point of view of tenant preferences. The survey is aimed primarily at investors active in the residential rental market, architects and developers.

**Keywords:** PropTech, rental market, customers' preferences.

## 1. Introduction

The real estate industry is currently undergoing a digital transformation that is not only changing its nature, but also contributing to its growth. This transformation is the result of a phenomenon known as PropTech, which is characterised by the massive implementation of emerging technologies such as drones, virtual reality, building information modelling (BIM), data analysis tools, artificial intelligence (AI), Internet of Things (IoT) and blockchain, smart contracts, crowdfunding in real estate, smart city, smart home or the sharing economy (Siniak, Kauko, Shavrov, Marina, 2020). Unfortunately, digital and information technologies on the real estate market are introduced late, but they still constitute an important element of innovation of entities in the field of online brokerage and sales, space commercialisation, handling the development process and the use of FinTech in mortgage and equity financing. Research within PropTech is becoming an increasing challenge and a necessity for the Polish real estate market. The leaders in this regard are the United States and China. It is admitted, however, that countries such as Spain, Finland and Poland may be important players in this sector (Tagliaro, Bellintani, Ciaramella, 2021). This is due to the fact that not only investors, but also developers, tenants, managers and real estate brokers are involved in the PropTech revolution (Cushman, Weakefield, 2021).

However, it is a common view that there is still no systematic PropTech analysis on a global scale, but also at the level of local real estate markets, including Poland. Moreover, the experiences of various countries in this field remain insufficiently researched, the scientific debate on PropTech has taken place recently. Taking up the topic as part of PropTech on the local real estate market is aimed at joining the discussion in this area and determining the possibilities of absorption of new technologies in Polish conditions.

The residential rental market was selected for analysis. The idea of the empirical part of the study was to assess the expectations of young clients regarding the application of modern technologies in rental apartments and their interest in properties equipped with such technologies.

The aim of the research was to consider young people as the group most frequently using rentals and potentially planning to make decisions regarding the purchase of apartments in the future. This research topic was also adopted due to the greater openness to modern technologies among young people. The generation of young people is unique, and one might say revolutionary in terms of market behaviors. No other user group in the housing market changes as quickly in terms of needs and behaviors, and the reason for this is the dynamic changes in the environment, including technological progress, which changes the behavior and approach to housing of the young generation (Chimczak, 2017). The so-called millennial generation seeks diverse content in the products offered to them. Unlike any previous generation, they use digital tools without limitations or inhibitions - over 90% of people in this group searching for apartments use the Internet (Kaya, Ozdemir, Dal, 2019).

The contribution of a paper would typically focus on several key areas:

- The study would provide insights into the attitudes, expectations, and preferences of young people when it comes to PropTech applications in rental apartments. This can inform landlords, developers, and real estate managers about what technologies resonate most with the younger demographic.
- By focusing on Poznań, a local real estate market, the paper adds value by offering a case-specific analysis that can highlight regional trends. This is crucial for stakeholders in the area and provides a framework for comparing Poznań with other similar cities or regions.
- The paper could contribute to the understanding of how various PropTech solutions influence rental decisions. This helps landlords prioritize tech investments that will enhance tenant satisfaction and improve leasing outcomes.
- study may explore both the opportunities and barriers young people face in embracing PropTech, this could be helpful for developers and investors in the residential market.
- The study can offer practical recommendations for property managers and landlords, helping them to better align their rental offerings with technological expectations, thereby improving the rental experience and potentially increasing profitability.

## 2. The concept of PropTech in the housing market

According to the CBRE report (2021), AI, Big Data and IoT are the main technologies used by PropTech that are changing the real estate sector, which is in the phase of advanced technological transformation. Innovation and digitisation serve to search for solutions that will increase efficiency and create new business models. Sensory and IoT offer a wide range of possibilities by generating millions of data on any resource that can be used with technologies such as artificial intelligence or machine learning, which was much more complicated just a few years ago. In addition, the COVID-19 pandemic has accelerated other trends such as virtual and augmented reality that became very important during lockdowns, allowing remote resource insight, and Blockchain or BIM, more advanced and cutting edge technologies.

PropTech mainly attracts the residential and office sectors, 70% and 67% respectively provide solutions for this type of assets, although it should be noted that 24% of projects are cross-sectional in all real estate products. PropTech in the residential sector is clearly more focused on the end customer, 23% of them have a B2C model, compared to the rest of the sectors (for comparison - 13% for retail real estate) (CBRE, 2021). According to the Global PropTech Confidence Index, 41% of investors in the modern technology sector show a dominant interest in multifamily solutions, and 21% of startups are targeting the multifamily building space, driven by the need for digitization and the attractiveness of the end market.

While some view PropTech as the sum or blend of software and hardware technologies that impact real estate markets, Baum (2017) has suggested that PropTech is only a small part of the broader digital transformation of the real estate industry. PropTech is leading to a digitised global real estate market that will likely be platform-driven and transaction tokenisation. Instead of lifetime investment decisions or rental contracts for years, buying, owning or renting real estate can become a seamless process mainly thanks to blockchain-based tokens. At the same time, smart homes, equipped with countless sensors, will communicate with the owner's smartphone to optimise energy efficiency and user comfort (Braesemann, Baum, 2021).

There are various definitions of the term PropTech. Generally, this concept is a combination of two words “property” - real estate and “technology” - technology. Shaw (2018) views PropTech as the sum of digital platforms that connect different real estate stakeholders. Rather than classifying digital real estate platforms, Shaw (2018) categorised stakeholders into four clusters and presented their interrelationships to facilitate different PropTech applications. “FinTech” and “ConTech” refer to technological applications in the financial and construction sectors, but are often difficult to distinguish from PropTech (Maududy, Gamal, 2019). PropTech has also been defined by the Royal Institution of Chartered Surveyors (RICS, 2018) and addresses all aspects of technology and its impact on built-up properties, including software, hardware, materials or the development process itself. Also, according to RICS (2018), the term PropTech is often overused and should refer to small start-ups that use

technology to solve market problems. The companies that make this move are also called PropTech and are mostly start-ups (Maududy, Gamal, 2019; Hasenmaile, Rieder, 2017) even though many small and medium-sized enterprises (SMEs) and corporations also play a significant role in introducing technology in the real estate sector (Baum, 2017). The social engineering aspect is also emphasised in PropTech terminology. The concept of Shaw's platforms (2018) is largely based on the essence of network infrastructure as an opportunity to create additional network effects and interactions.

The common denominator of all PropTech definitions is to achieve greater efficiency and effectiveness of real estate, which involves three main real estate industries: facility, property and asset management (Gamal, Maududy, 2019). However, PropTech companies also deal with the real estate market, software and databases, and the Internet of Things (IoT). The PropTech sector covers various activities, from property management to financial, transaction, construction, data exchange, maintenance and facility management services.

There is no common definition of PropTech, making it difficult to define the investments and market segments that have been involved in this new digital wave. It is still unclear what technologies and actors are involved in the digitisation of the real estate sector and what their potential for innovation is. Finally, some countries appear more proactive than others in keeping up with the pace of change (Tagliaro, Bellintani, Ciaramella, 2021).

Baum (2017) defines three PropTech sectors: smart real estate, shared economy, and FinTech. Smart Real Estate includes technology-based platforms that facilitate the operation and management of real estate. Platforms can provide information on the performance of buildings or urban centres, or they can directly facilitate or control construction services. This sector supports real estate management (Baum, 2017). The shared economy describes technology-based platforms that facilitate the use of real estate assets. Assets can be land or buildings, including offices, shops, warehouses, flats, and other types of real estate. Platforms can simply provide information to potential users and space sellers, or they can more directly facilitate or conduct rent or fee based transactions. This sector supports the real estate tenant markets. Real Estate FinTech describes technology-based platforms that facilitate real estate trading. Assets can be buildings, stocks or funds, debt or equity; property may be owned or leased. Platforms can simply provide information to prospective buyers and sellers, or they can more directly facilitate or carry out asset or lease ownership transactions with a (negative or positive) capital value. This sector supports real estate capital markets.

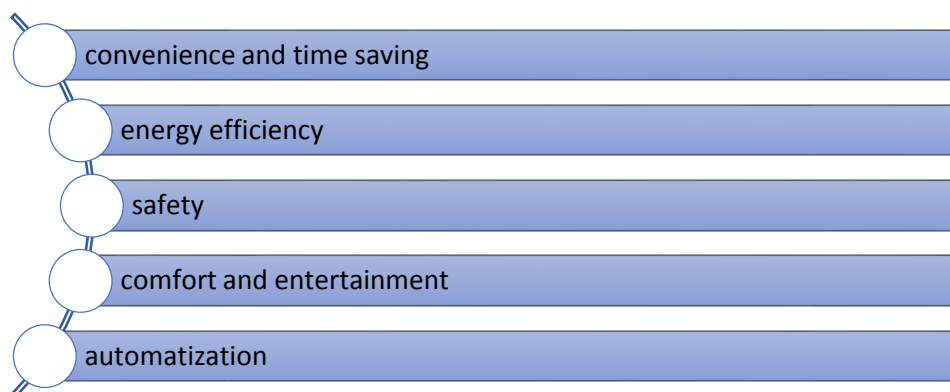
In the rental housing sector worldwide, various modern technologies are being introduced, serving both investors (landlords) and tenants. The most significant among them are:

- Building Management Systems (BMS): primarily energy management systems, lighting, heating and air conditioning control, smart locks, video monitoring, and alarm systems.

- Internet of Things (IoT): including smart home devices (refrigerators, washing machines, thermostats, smoke detectors) and energy management systems (smart energy meters, water, and gas meters).
- Property Management Platforms: applications for rental management (facilitating communication between landlords and tenants, online rent payments, maintenance requests) and tenant management platforms (collecting feedback, analyzing tenant data).
- Virtual Reality (VR) and Augmented Reality (AR) Technologies: virtual tours (3D presentations of apartments that potential tenants can view remotely) and AR in interior design (the ability to visualize changes in interior decor before actual implementation).
- Blockchain Technologies: automation of rental processes, ensuring transaction security.
- Artificial Intelligence (AI) and Data Analysis: market forecasts (predicting market trends, analyzing tenant behavior) and chatbots (automating customer service, answering tenant questions 24/7).
- Green Technologies: green building (using energy-efficient materials and construction technologies) and water collection and recycling systems (reducing water consumption, purification systems).
- Space Sharing Technologies: co-living (platforms and applications facilitating apartment sharing, managing shared spaces) and shared services (cleaning, transportation, recreational space services).

These technologies significantly improve the quality of life for tenants, increase the efficiency of property management, and can bring tangible benefits to investors and apartment owners.

Tenants are increasingly interested in modern technologies for several key reasons (Figure 1). Firstly, modern technologies, such as smart home systems, can greatly facilitate daily life. The ability to remotely control lighting, heating, air conditioning, and security systems through mobile applications is very attractive to many people.



**Figure 1.** Most frequently used motives for introducing modern technology in apartments.

Source: own study.

Furthermore, any technologies that increase energy efficiency, such as smart thermostats or energy-efficient appliances, are becoming increasingly popular. Customers appreciate the ability to lower utility bills and embrace a more eco-friendly lifestyle. Another motivation for choosing certain apartments is security concerns. Modern security systems, including surveillance cameras, smart locks, and motion sensors, enhance residents' sense of safety. Additionally, technologies such as smart audio-video systems and high-speed fiber-optic internet are often sought after by tenants who value comfort and modern entertainment solutions. Lastly, but no less important than the other factors, is the automation of various aspects of home life, which can include automatic plant watering, robotic cleaners, or systems for managing household appliances.

The following research questions were formulated in the study:

1. what expectations of technology (PropTech) do young people have when renting flats in Poznan?
2. how does the use of PropTech technology influence young people's decisions to rent flats?
3. what barriers stand in the way of wider use of PropTech technology among young flat renters in Poznan?
4. does the use of PropTech technology in flats for rent increase the competitiveness of offers on the real estate market in Poznan?
5. what are the long-term trends in the use of PropTech in rental flats in Poznan?

These research questions allowed for a broad analysis of the impact of modern technology on the rental housing market from the perspective of young people in Poznań and can provide valuable insights for property owners, developers and technology companies.

### **3. Research methodology**

To investigate students' opinions on the application of modern technologies in rental apartments and their interest in properties equipped with such technologies, a survey was conducted. This study continued research previously carried out by the authors as part of a research team focused on the use of modern technologies in the residential real estate market. The earlier research was conducted in 2021 among potential homebuyers and addressed the perception of modern technologies in the context of home purchase. Based on previous research, a series of articles have been written (Górska, Mazurczak, Strączkowski, 2021, 2022a, 2022b; Górska, 2021; Mazurczak, 2021) The results presented below pertain to a study conducted over three months - April to June 2024. The subjects of the study were primarily undergraduate students, but also included postgraduate students from universities in Poznań, as they are current and potential apartment renters. The study focused on the perception of

modern technologies in the context of choosing an apartment and conducting the rental process, as well as the perception of modern technologies used in residential construction that are attractive and significant when selecting a rental apartment.

A questionnaire survey was chosen as the research tool. The sampling method was non-random, but it had elements of purposive sampling (the respondents were mainly undergraduate students), with elements of non-purposive sampling (conducting the survey online means that we do not have full control over who the respondent is, which introduces an element of randomness). Although the survey questionnaire was completed online, a person was present during the completion of the online survey to whom respondents could address any questions or concerns about the survey. The methodological assumptions related to the conducted research are presented in Table 1.

**Table 1.**

*Research on Tenants' Use of Modern Technologies in Rental Apartments*

Research subject	Mainly undergraduate full-time students at universities in Poznań, who are potential tenants of apartments. Such a research entity was adopted due to greater openness to modern technologies.
Subject of the study	Attitudes of current and potential homebuyers towards modern technologies used in residential properties.
Selection and size of the sample	Non-random, has the features of purposeful selection, with elements of non-random selection, n = 369.
The spatial scope of the study	Local housing market in Poland.
Time range	3 months of 2024 – from April to June.
Research tool	Internet survey questionnaire.

Source: Own study.

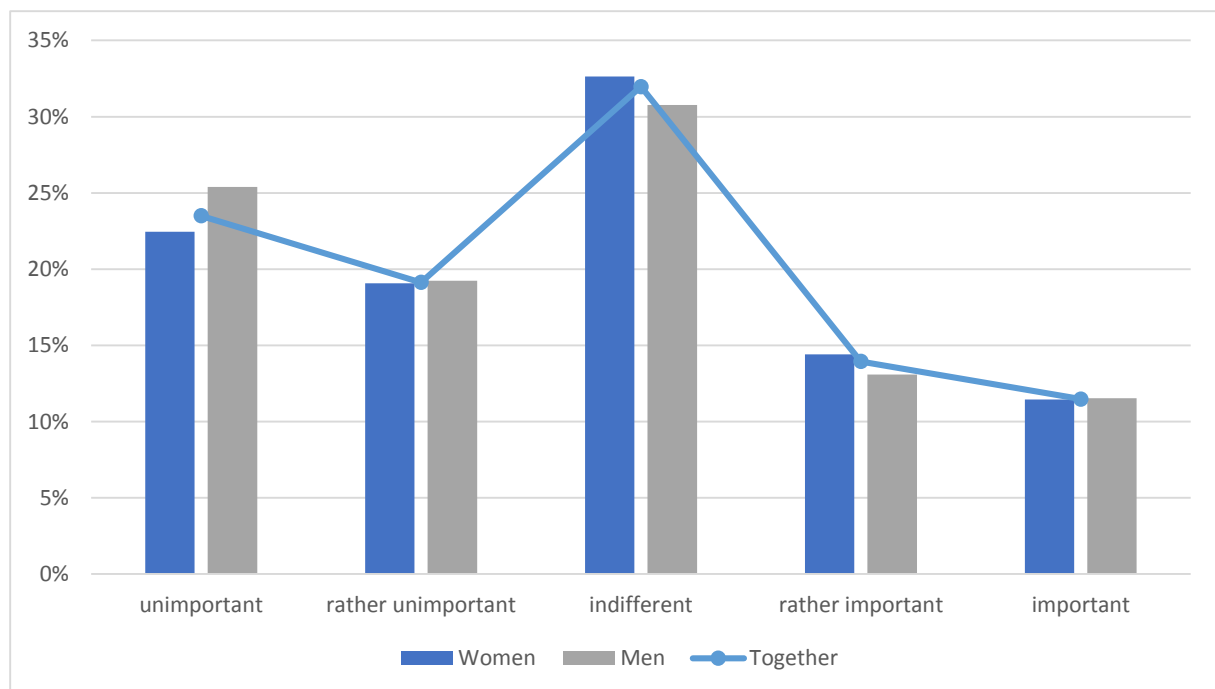
A survey was conducted in the local residential real estate market in Poznań. In the first stage, a pilot study was conducted among real estate professionals and questionable questions were eliminated and removed from the final survey questionnaire. Then an online survey questionnaire was created in google forms, which was used to conduct the survey. The questionnaire consisted of 19 questions, 5 of which were metrics. The questionnaire included both open-ended and closed-ended questions, with 8 questions being open-ended, while the remaining questions were either single-choice or multiple-choice closed questions. The article used responses to 3 questions, all of which were either closed multiple-choice questions or with the need to respond to the statements given on the scale presented. The number of respondents was 369 students and they represented the community of the largest higher education institutions in Poznan - the University of Economics, Adam Mickiewicz University, the Academy of Physical Education, Poznan University of Technology and the University of Life Sciences, and the collected data is a contribution to further research. Apartment renters accounted for 56% of respondents, while 44% of respondents did not currently rent an apartment. The majority were women (64.5%), with the largest group aged 20-22 (57%). Other respondents were between 23 and 24 years old (17.8%). The oldest respondent was 46, with an average age of 21. The largest group plans to have two children in the future (47%), while 15% plan to have three, and 8% plan to have one child. One in five



respondents does not plan to have children. Over three-quarters (84.8%) were undergraduate students, while 15.1% were graduate students. More than half (56.8%) were tenants at the time of the survey, while 43.2% were not. Among the tenants, over three-quarters lived with others, and one-quarter rented an apartment/house independently.

#### 4. Research results

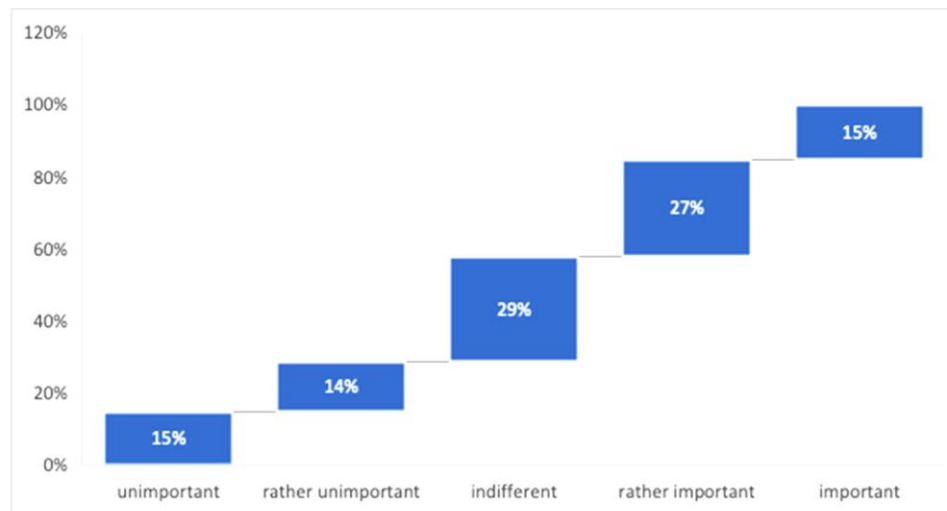
Modern technologies are present in every aspect of our lives. In homes, their application can significantly enhance comfort and convenience. The use of modern technologies in real estate affects both homeowners and increasingly rental properties. This raises the question of whether tenants are genuinely interested in renting such properties and their feelings about their implementation. The first issue related to modern technologies concerned the rental process itself and the possibility of remotely viewing rental properties. According to the survey (Figure 1), this option is not important for most potential tenants (32%), about one-third are indifferent, and only 26% would pay attention to this aspect. The answers given were also checked by men and women, but as the survey shows, both sexes are similarly attuned to the issue of remotely viewing an apartment.



**Figure 2.** How important is the ability to view an apartment remotely for you?

Source: Own study.

The next question concerned the ability to sign a lease agreement remotely. This method is becoming increasingly popular due to time savings, especially for those living far away, and it provides greater flexibility in scheduling meetings. After the Covid-19<sup>1</sup> pandemic, remote signing also reduced infection risks for many people. Over 40% of respondents said this option would be very important to them, while 30% found it insignificant. Nearly one-third were indifferent to remote signing (Figure 3).

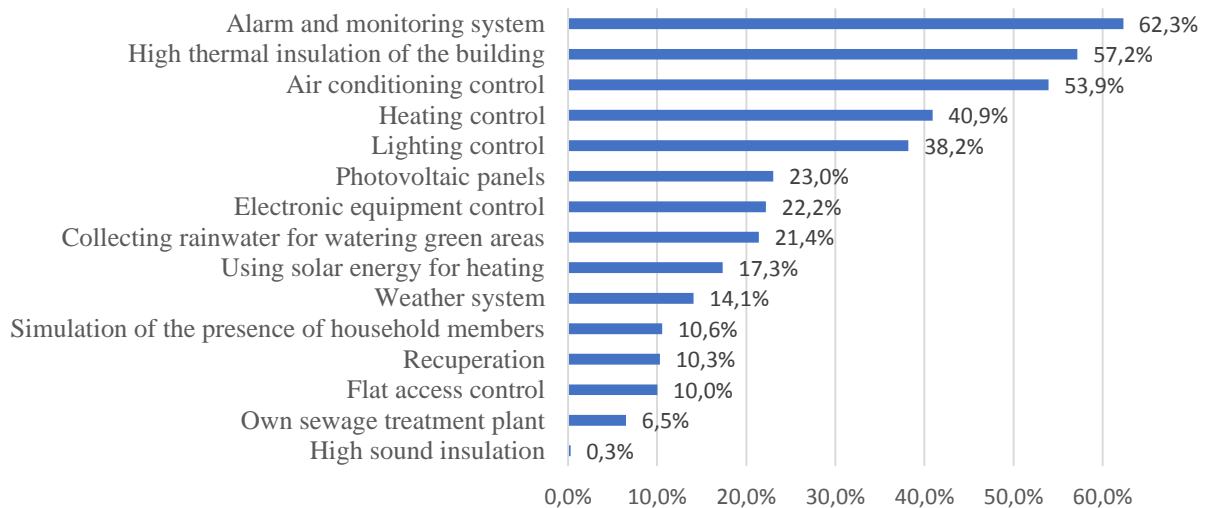


**Figure 3.** How important is the ability to sign a lease agreement remotely for you?

Source: Own study.

In the next question (Figure 4), potential tenants were presented with modern technologies that could be used in rental apartments. For most respondents, the most important technologies were alarm and monitoring systems, high thermal insulation of the building, and air conditioning control—over 50% indicated these options. Slightly fewer—around 40%—considered heating and lighting control important. About 20% of respondents pointed to photovoltaic panels, electronic device control, and rainwater collection for watering green areas. Less important were solar energy for water heating, weather systems, occupant simulation, ventilation, and access control. The least important were having a wastewater treatment plant and high acoustic insulation (below 10%).

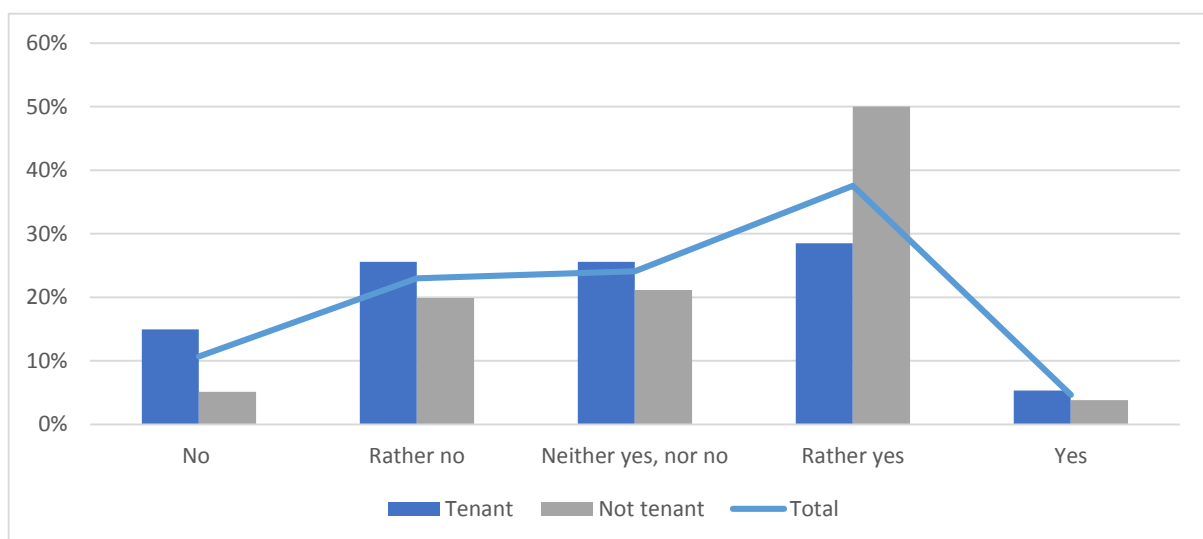
<sup>1</sup> According to WHO COVID-19 (coronavirus disease 2019) - acute infectious disease of the respiratory system caused by infection with the SARS-CoV-2 virus. It was first recognised and described in November 2019, in central China (Wuhan city, Hubei province), during a series of cases that started the pandemic of this disease.



**Figure 4.** Modern technologies most important to tenants when choosing an apartment.

Source: Own study.

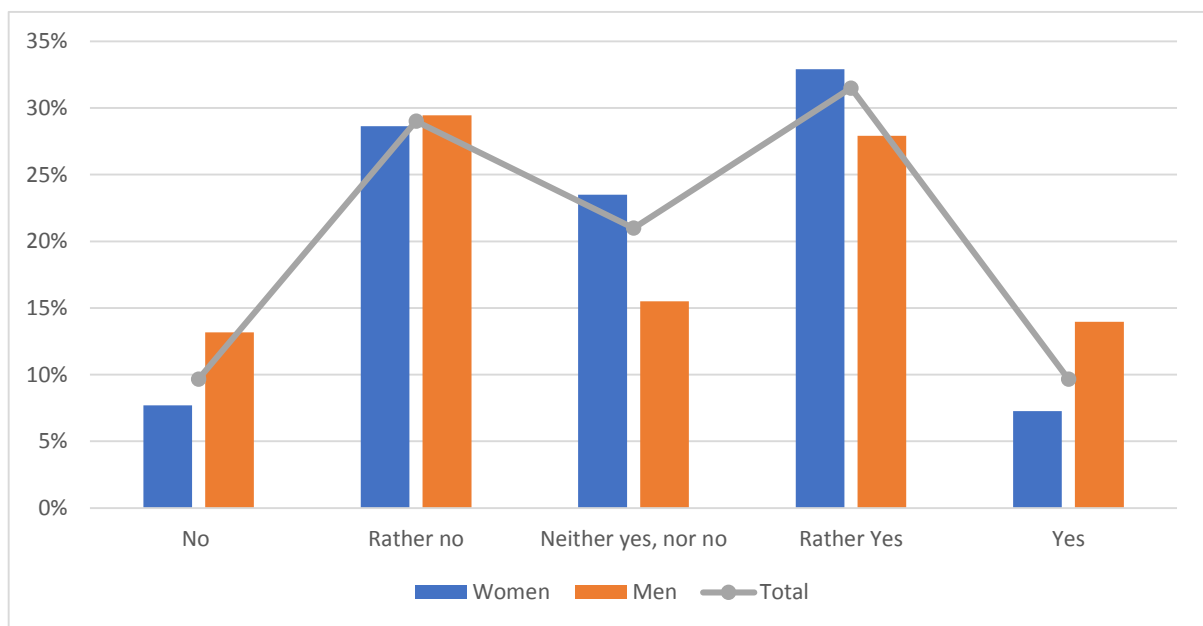
Current and potential tenants were asked if they would be willing to pay more for the application of modern technologies in the apartments they selected. According to the survey, the majority of respondents (43%), both tenants and non-tenants, answered affirmatively, with significantly more non-tenants expressing approval for such a situation. Approximately 33% of all respondents would not or rather would not be willing to pay more, with current tenants more likely to give this response. It can be concluded that it would seem that the use of modern technologies can attract tenants and influence them to pay higher rent. However, as can be seen from the chart, it is mainly non-tenants who are willing to pay for modern technologies. For existing tenants, this willingness is much lower. This means that current renters who are aware of the expenses associated with renting an apartment believe that the benefits of modern technologies are not great enough to pay more for them (Figure 5).



**Figure 5.** When buying a flat, would you be willing to pay more for the technologies you choose?

Source: Own study.

In the next question, tenants were asked to respond to the statement whether they believe modern technologies contribute to reducing the costs of maintaining an apartment. Responses to the question were almost evenly distributed, as about 40% of respondents agree or somewhat agree that modern technologies reduce the costs of maintaining an apartment, with affirmative responses more common among non-tenants. Another 40% of respondents, however, believe that modern technologies do not or rather do not have an impact on costs, with tenants more likely to believe this compared to non-tenants. One in five respondents could not determine whether the use of modern technologies affects cost reduction. It might seem that a relatively large number of people would point out that new technologies mean lower costs, especially since it is widely known that high thermal insulation of buildings, control of heating, lighting and air conditioning can significantly reduce the cost of maintaining an apartment, yet the opposite is true. Perhaps it is necessary to raise awareness among the public that the innovations applied through optimization of consumption can result in financial benefits for both the tenant and the property owner, making the apartment more energy sustainable and economically viable (Figure 6).

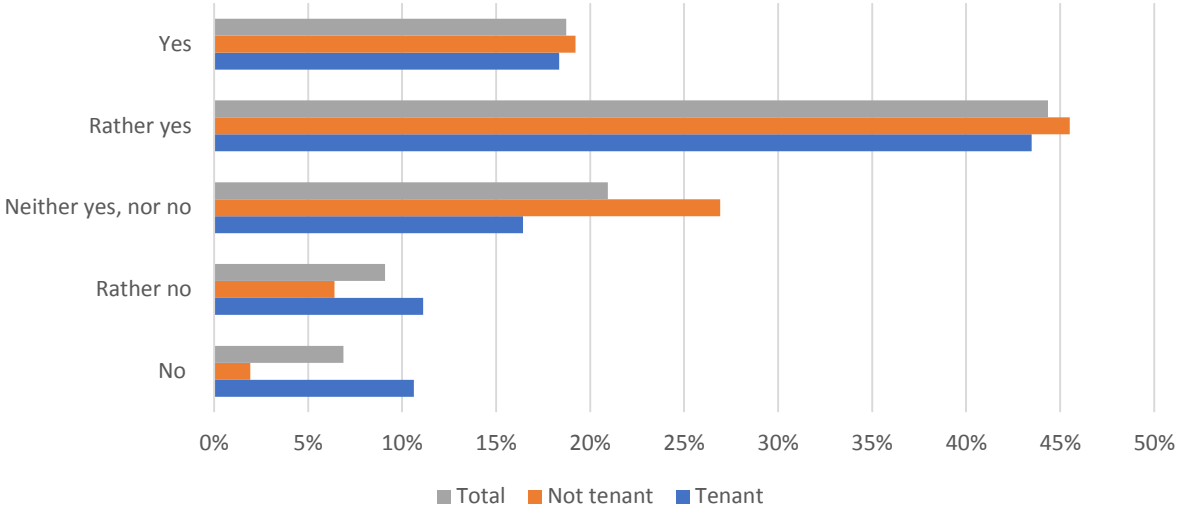


**Figure 6.** Do you think that the indicated technologies reduce the cost of maintaining a flat?

Source: Own study.

It seems that introducing modern technologies into apartments should increase the attractiveness of the offer in the eyes of potential tenants. Technological innovations related to smart home systems or media management, resulting in convenience and savings, should attract potential tenants. But is this really the case? As shown in the survey (Figure 7), the majority - 19% of respondents answered 'yes' and 44% answered 'rather yes' - believe that modern technologies will increase their interest. Both tenants and non-tenants of properties responded affirmatively. On the other hand, 21% stated that they themselves do not know whether new technologies will increase the attractiveness of the offer or not. Only 16% of respondents

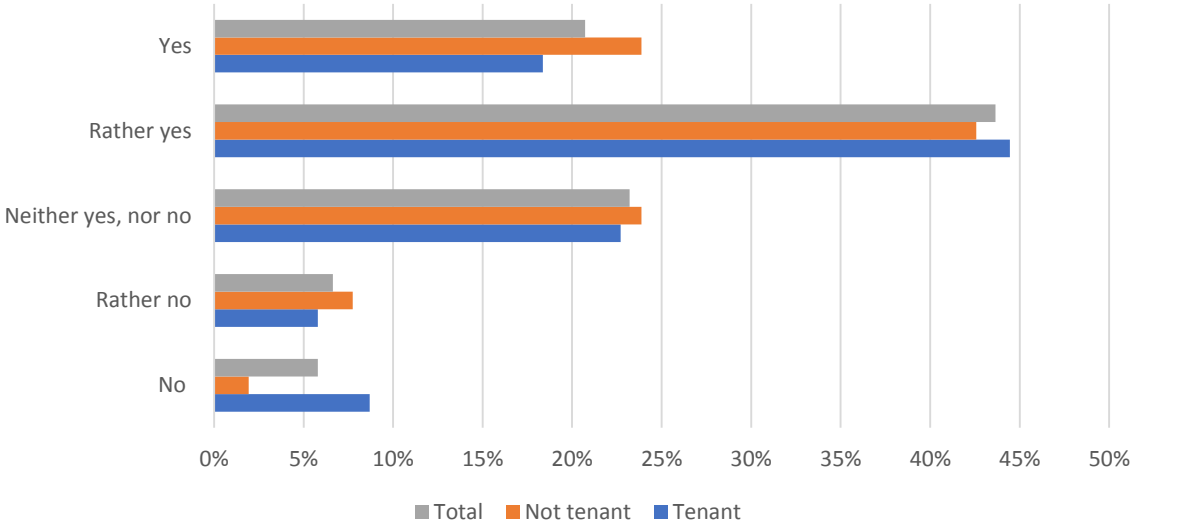
believe that it does not or rather does not affect whether the offer will catch their attention, with current tenants of properties more likely to give this response.



**Figure 7.** Does the presence of modern technologies in the investment make you more interested in a given housing offer?

Source: Own study.

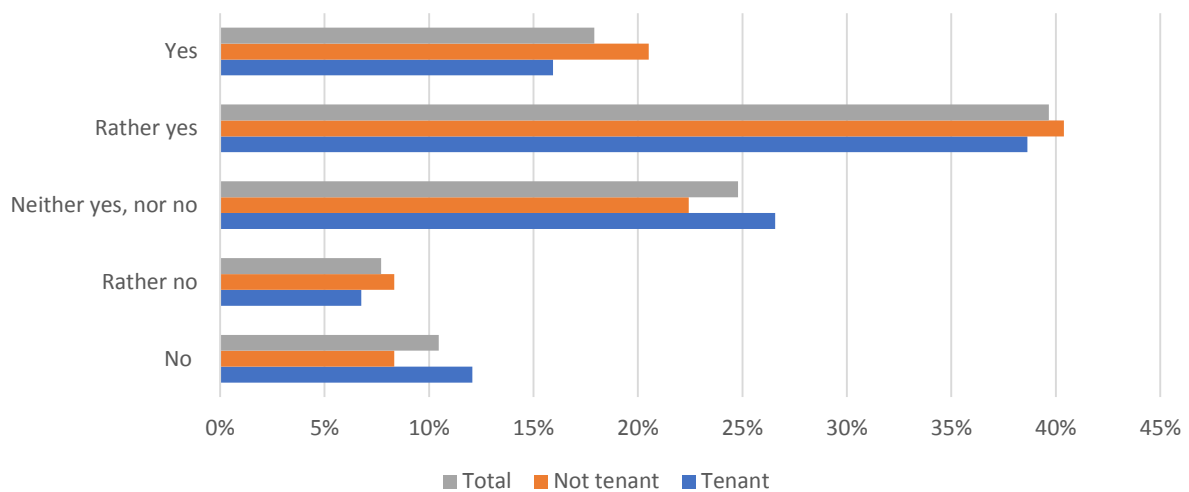
In response to the next question, 65% of respondents acknowledged that the use of modern technologies affects an increase in their sense of security. Only 13% of respondents would not feel any difference, while just over 20% could not determine if modern technologies would affect their security in any way. Modern technologies can significantly impact security in rental apartments. Monitoring and security systems, smoke and gas detectors, smart alarm systems can significantly enhance property security (Figure 8).



**Figure 8.** Does the use of modern technologies make you feel safer in your flat?

Source: Own study.

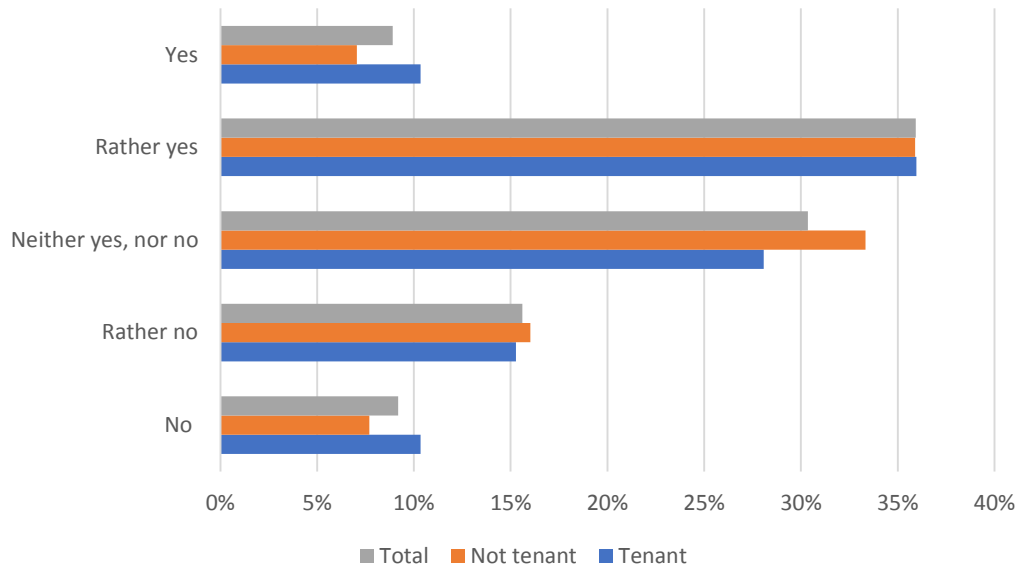
The next question concerned the sense of prestige and recognition (Figure 9). Smart home systems, photovoltaics, smart devices, and sustainable ecological solutions influence both quality of life and how owners/tenants are perceived by their surroundings. Owning a well-equipped apartment can be seen as a symbol of modernity, luxury, and ecological responsibility. Do the authors' survey among tenants confirm this? Indeed, more than half (58%) of current and prospective tenants believe that the use of modern technologies affects or can affect their sense of security. About a quarter of respondents cannot determine if it has an impact, and nearly one-fifth (18%) believe that security does not depend on the technologies used. For this question, both current and potential tenants were in agreement with their responses.



**Figure 9.** Does the use of modern technologies in a flat create a sense of prestige and recognition from the environment?

Source: Own study.

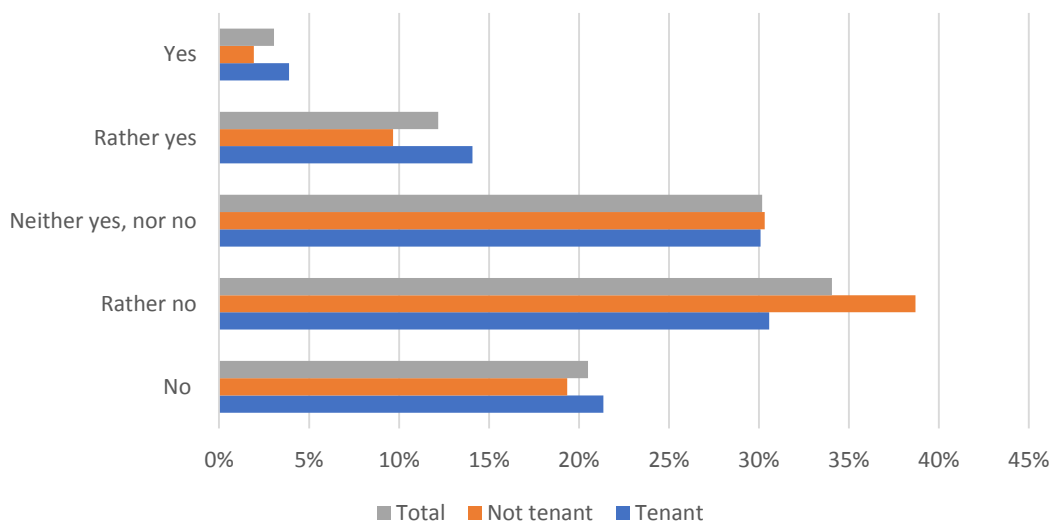
In response to the question of whether modern technologies give a sense of environmental responsibility, nearly half (45%) of respondents believe that they do or somewhat do. Approximately one-third (with more responses among non-tenants) cannot determine if they feel this way, and about a quarter believe that modern technologies do not or rather do not contribute to environmental actions (Figure 10). Introducing modern technologies in the real estate market is associated with environmental benefits and can therefore provide a sense of fulfilling environmental responsibility. Actions such as increasing energy efficiency, raising awareness of media consumption, and using renewable energy sources reduce the carbon footprint. This increases user awareness and promotes a sustainable and ecological lifestyle.



**Figure 10.** Does the use of modern technologies give you a sense of fulfilling environmental responsibility?

Source: Own study.

The last question concerned the negative aspect of modern technologies - their impact on the feeling of being controlled. The use of smart home systems, remote control and automation, data collection on consumer habits and behaviors, as well as monitoring, can lead to a sense of being controlled. However, this is not confirmed by the survey results - more than half (54%) of tenants believe that modern technologies do not (20%) or rather do not (34%) affect their sense of being controlled. About 30% are undecided about a possible response, and only 15% believe that such control exists or is possible (Figure 11).



**Figure 11.** Does the use of modern technologies make you feel controlled?

Source: Own study.

According to the survey, apartment owners and also future investors should consider using modern technologies in apartments for rent. This is especially true for technologies that are related to saving on utility consumption and thus reducing operating costs. Better thermal insulation of the apartment, control systems for lighting, heating or air conditioning are those technologies that are most in demand. In Poland's local real estate markets, investors mostly do not use modern technologies related to the building itself, such as photovoltaic panels powering the common areas of rental properties, and the modern technologies used in buildings are mainly related to tenant service issues. The high interest of respondents in apartments distinguished by high thermal insulation and the ability to control home installations to adapt them to the weather conditions outside and the functioning of the householders is primarily related to the rising cost of electricity. The tenant does not bear the investment costs of furnishing the apartment, but incurs operating costs, which are constantly increasing, and therefore sees the need to optimize them. Controlling heating, on the other hand, results in a decrease in the cost of thermal energy, which, according to the Central Statistical Office's survey of household budgets, along with electricity, accounts for the largest part of housing expenses. Another aspect is enhancing tenant security – alarm and monitoring systems were the most frequently chosen desirable technologies in apartments. Beyond tenant comfort, these technologies also provide comfort to the owner by enhancing the security of the apartment itself.

Introducing modern technologies also increases the attractiveness of the apartment to potential tenants, giving them a sense of recognition and prestige for which they are willing to pay more. Following market trends allows a property to stand out in the market and attract the attention of more discerning and affluent clients. Consequently, rental rates are usually higher, and the market value of the property increases.

## 5. Conclusions

Market research indicates that there is a growing demand for apartments equipped with modern technologies. Reports show that tenants are willing to pay higher rent for apartments that offer advanced technological amenities. This trend is particularly noticeable in large cities and among younger generations, who are more familiar with new technologies.

Summarizing the above results, the following research conclusions can be formulated:

- the Polish residential market the observed technological advancement is an effect of changes that have taken place in recent years as a response of investors, landlords and tenants to the growing importance of sustainability and environmental requirements in the housing market;



- the results of the above research can make an important contribution to the literature dealing with PropTech in Poland. As already mentioned in the conclusion of the theoretical part, the national literature on the subject has not really dealt with this topic so far. Therefore, it can be considered that this study fills a research gap in the domestic market. At the same time, it is a voice in the international discussion in the PropTech area that has been going on for several years;
- the local housing market is undergoing numerous changes, including changes in the use of modern technologies at the stage of design, implementation and use of residential facilities. These changes are dictated, in large part, by the need for different groups of actors involved in the investment process to respond to the evolution of customer needs. The study points out the importance of studying the preferences of housing buyers and users;
- the surveyed age group of customers under 25 is obviously one of the groups of customers who is present on the residential market. It is the most active and at the same time technologically aware group of buyers. The authors are aware of the need to include other age groups. The above study is an initial work, and further stages include further research work in which other groups will be included.

It should be emphasised that the authors are aware of the limitations of the study conducted:

- The study is focused on the local real estate market in Poznań, which may not fully represent the wider real estate markets in Poland or other countries.
- The research focuses on young people, which means it doesn't account for the perspectives of other age groups who might interact with PropTech differently. Older generations might have contrasting views on the use of modern technologies in rental properties.
- Case studies often have smaller sample sizes. If the sample size in this study is limited, it could affect the robustness and reliability of the findings. A larger, more diverse sample would allow for broader conclusions.
- The technology landscape evolves rapidly. The study might reflect the technologies available at the time of research, but some of these technologies may become outdated or more sophisticated, limiting the study's long-term relevance.

However, despite the aboved mentioned limitations, the above study can provide a starting point for examining the sophistication of landlords in local real estate markets, considering the needs and expectations of potential customers.

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