Innovation in Development Projects in Poland in the Context of Company

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Abstract: This article aims to identify the introduction of innovations in the activities of residential developers in relation to company size. In order to achieve the objective, the results of a survey conducted in Poland in the form of a questionnaire among developers of the primary residential market, implementing investments in the field of multi-storey multi-family construction, were used. The research conducted allowed the identification of the percentage of residential developers introducing innovations in their real estate projects. Moreover, the structure of the innovations introduced was presented, taking into account the role they play in the market. A correlation of the innovations introduced in their activities with the size of the company and the market range in which the company operates was revealed. The information presented is of key importance today due to the need for innovation in renewable energy sources, which allow for diversification and security of supply in the context of the armed conflict in Ukraine. Introducing innovations in the real estate market is becoming necessary in EU countries due to regulations aimed not only at increasing the competitiveness of EU economies through increased innovation but above all at achieving sustainable development goals — including net-zero carbon emissions. EU regulations introduce strict requirements concerning, among other things, the energy performance of buildings, which will result in the need for innovative projects not only in the primary market but also for projects aimed at modernizing the existing stock (secondary market), which, according to research, is often carried out by smaller companies that have not yet applied innovative solutions in their operations.

Keywords: Innovation, Renewable Energy Sources, Sustainable Construction, Climate Neutrality.

1. Introduction

Socio-economic development is linked to the development of science and technology, where innovation became the catalyst for social and economic change (Fundacja Innowacji i Nowoczesnych Technologii, 2021), thus contributing to the competitive position of regions.

The further dynamic development of the world economies was made possible by the introduction of innovation (Hult et al,2004; Jin et al, 2004). Article 173 (2016) of the Treaty on the Functioning of the European Union (TFEU) within the framework of the Lisbon Strategy (2000), Europe 2020 strategy (European Commission 2010), and now within the framework of Sustainable Europe until 2030 and initiatives such as the “Green Deal” (Green Deal 2022) and Fit for 55 (2023), explicitly emphasis sustainable development, ecological transformation and achieving climate neutrality, which is possible through the implementation of innovation (Innovation Policy, 2023). This implies that green transformation developments will largely affect the real estate sector, as this sector is highly energy-consuming and accounts for a large proportion of greenhouse gas emissions.
The geopolitical situation, namely the armed conflict in Ukraine, is also a driver for innovation in the real estate market. As a direct consequence of Russia’s invasion of Ukraine, the price of raw materials, particularly energy commodities such as oil, natural gas and coal, of which Russia is a strategic exporter, rose dynamically and by leaps and bounds. The situation was all the more serious as Russia was the EU’s main supplier of energy resources, which, combined with successive restrictions, such as the embargo on imports of individual raw materials from Russia, resulted in a cascade increase in their price and also in energy security risks. (Karlinski, 2022; Polish Economic Institute, 2023).

The motivation for addressing the problem was (until the COVID-19 pandemic and the Russian intervention in Ukraine) the highly accelerated economic development associated, among other things, with innovative activities. In Poland, over the last thirty years, the centrally planned state economy was replaced by market economy mechanisms. This creates the necessity to intensify the implementation of innovations to increase the competitiveness of the Polish economy.

Innovation is the basis of knowledge-based leadership, enabling the use of advanced integration methods and practices to achieve organizational goals (Hallinger and Suriyankietkaew, 2018; Faouri 2023, SAhouwen et al. 2022). In light of the above, it can be concluded that green knowledge management is a particularly important concept meaning the management of capabilities and knowledge related to sustainable technologies and

environmental practices. This means that knowledge management is one of the elements of effective implementation of innovations.

Taking into account the current geopolitical risks and the EU regulations being introduced, especially the consequences of real threats resulting from climate change and environmental degradation, an attempt was made to analyze the problem presented above. The paper aims to identify the role of innovation in the activities of residential developers in Poland in the context of changes triggered by the geopolitical crisis and EU legislative initiatives.

The paper reviews the literature on innovation in the real estate market, legislative initiatives undertaken by the EU, particularly in the area of innovation, climate and energy policies, and the consequences in the state's economy and policy caused by the conflict in Ukraine. The author's own survey was used, which was conducted among residential developers in Poland in the second half of 2020 and in the second half of 2022. The results of the study are then presented and discussed in the context of the literature review provided in the preceding section. Synthetic conclusions from the conducted research were used to formulate general recommendations for the development of the Polish housing sector.

2. Literature Review

The dynamic development of world economies is made possible by the introduction of innovation. The most comprehensive market definition is cited by the Oslo Manual (OECD/European Union, 2018):

A new or improved product or process (or a combination thereof) that differs significantly from an entity's previous products or processes and that has been made available to potential users (product) or put into use by the entity (process). However, for the real estate sector, the market definition of innovation was defined according to Bac (2014) and Pryston (2012) as: innovations in the real estate market particularly concern production methods and new goods, i.e. new construction methods and techniques ensuring the creation of a new product (building or structure) meet with energy, ecological and utility standards. They concern production factors (goods, services, production methods, sources of raw materials, or organization of production processes) and new economic activities or new services. Therefore, innovation in the real estate market stimulates pro-ecology, issues of energy efficiency, ergonomics and renewable energy sources. Innovations in the real estate market will stimulate sustainable development.

The development trends of innovation are: (Kamiński 2022):

- the increase in the share of new technologies — web and mobile solutions — is one of the most significant developments in the real estate market,
- the development trend of innovations concerning big data, databases, machine learning, neural networks or artificial intelligence — is widely used in real estate valuation and decision-making support in the investment process,
- the development trend of geolocalization is an extraordinary tool, highly useful, used in marketing, navigation or local services,
- the development trend in construction innovations points to the important influence of electronics and building automation on the functioning of buildings.

As can be seen from the literature analysis (COM 2019; European Climate Law 2021; Green Deal 2022; Fit for 55 2023; Just Transition Fund 2021; Fit for 55, 2023; Fit for 55, 2023; COM 2021). EU countries have committed to achieving climate neutrality by 2050 and thereby fulfilling their obligations under the Paris Agreement (The Paris Agreement, 2015). The EU's green transformation comprises a package of initiaties among which those applicable to the real estate sector should be particularly highlighted:

- Green Deal (2022), (European Climate Law (2021) as the heart of the Green Deal, 2019). The European Green Deal is a package of policy initiatives that aims to put the EU on the path to a green transition and ultimately to achieve climate neutrality by 2050. In this regard, the UN's "Our Common Future" Report (United Nations, 1987, pp.18–19, 119) as well as Vademecum Bezpieczeństwa (2018) emphasise that the importance of energy for the world's developing economies will be increasing.
- the Fit for 55 package (Fit for 55, 2023) as a set of proposals to revise climate, energy and transport legislation and introduce new legislation to bring Union law in line with its climate goals.

- European Climate Pact (2021). - The EU and its Member States have committed to reduce net EU greenhouse gas emissions by at least 55% by 2030, compared to their 1990 levels (European Commission, 2016; COM 2020);
- European industrial strategy, including circular economy. The EU is counting on European industry to steer the transition towards climate neutrality (COM 2020; European Parliament Regulation, 2021);
- In March 2020, the European Commission presented a new roadmap for a circular economy, highlighting the need to ensure green recovery from the Covid-19 pandemic.
- The EU has introduced the Just Transition or Sustainable Finance Mechanism (Parliament Regulation..., 2021; Just Transition Fund JTF, 2021) to financially and technically support regions as a result of the transition to a low-carbon economy. From the perspective of the topic under discussion, the most important consequence of the war in Ukraine seems to have been the increase in the price of energy raw materials, as well as of the supply of such raw materials. This has resulted in an even stronger pressure to develop innovations within the framework of renewable energy sources, driven by the increased importance of energy self-sufficiency (Kolany 2022).

Rapid changes in the perception of technology and knowledge management have led to an increase in interest in ecological knowledge management as a source of competitive advantage (Abbas and Sağsan 2019; Santoro et al., 2019). Managing ecological knowledge is a fundamental factor for a company's survival, leading to great results, such as increasing competitive capabilities in the market (Hottenrott et al., 2016). Optimizing the knowledge process prompts companies to further focus on sharing and organizing green knowledge to replace traditional business perceptions for sustainability (Buter & Van Raan, 2013; Tajpour et al., 2022). The current level of developers' knowledge regarding ecology and green knowledge management requires the development of knowledge, support and transfer of know-how of the innovation project management process. Therefore, the presented EU requirements forcing the implementation of innovations, especially in the field of energy efficiency, should result in the implementation of innovations combined with appropriate knowledge management in this area. To be effective, the process of introducing innovations should be associated with appropriate knowledge management in this area.

Developers, including residential developers, are pursuing a variety of projects - for example lofts. Brown (2018) distinguishes several elements of a successful model for modernization and its management. He points to value as the guiding principle for managing innovation, assuming that value must be based on comfort, well-being, health and aesthetics. He also notes the very topical issue of guaranteeing energy savings and the savings-related integrated supply chains that can provide “a whole-home approach”.

In Poland, price, comfort, well-being, health and aesthetics are also factors driving innovation in the real estate, especially the housing, market. Zhang (2020), on the other hand, shows that risk is one of the driving factors for implementing innovation by investors in the Chinese real estate market. He demonstrates that risk has a positive impact on firms’ innovation performance, including R&D investment, innovation level and other innovation outcomes.

This should be understood in the context of risk appetite, as the taking of risks allows for above-average returns. Therefore, taking into account the risk of non-innovation, one can conclude that it is a driver for increased innovation in business, also for developers.

Killip and Owen (2020) argue that in order to study the real estate investment process, usually in the secondary market, two markets need to be analyzed: the first is the market of repair, maintenance and improvement (RMI) of houses, where energy efficiency, and thus the implementation of innovations, is not the most important; and the second is the market of deep modernization, where the main goal is energy efficiency and thus precisely the implementation of innovations such as energy efficiency. The first market — the RMI market — is dominated by small and medium-sized enterprises, especially micro-enterprises, operating in local markets. Those companies do not maximize profits or focus on the energy efficiency of buildings. In the second market, companies are focused on energy efficiency and are usually large companies working together in regional and national markets. The same situation exists in the primary residential market.

Taking this into account, it is important to emphasize that EU regulations (especially energy regulations) and the need to innovate within the framework of energy decarbonization have also introduced smaller companies to the real estate market (European Court of Auditors, 2017). They presuppose the necessity to reduce the energy consumption of buildings, of the entire stock not only newly built but also the already existing one, in order to meet the standards of having appropriate energy certificates for buildings. If these conditions are not met by

2050, it will not be possible to rent or sell a flat without meeting these conditions. (Central Office for Construction Supervision, 2024).

The introduction of innovations in the housing market refers not only to the use of housing but also, importantly, to resource efficiency in the housing production industry and operational energy efficiency. Industrialized Housing Construction (IHC) is a strategy for implementing emerging innovations in resource-efficient housing (Rohn et al. 2014). Under this strategy, innovations, including RES, are important drivers of value creation in the housing Modular technologies can compete with traditional technologies in the context of sustainability and, at the same time, serve as a cost-optimal solution in the decarbonization of building resources (Kaczorek et al., 2023).

The analysis of the literature has made it possible to identify a research gap in the implementation of innovations by residential developers in the real estate market, which is most relevant to real estate development activities in Poland. To answer the research questions presented below, a survey was conducted and the results analyzed. The research questions were set as follows:

1. What is the percentage of residential developers implementing innovations in Poland?
2. Does the market range of operations of a development company and its size influence decisions to implement innovations in residential projects?
3. What type of innovation is most frequently implemented by residential developers in Poland?

3. Material and Methods

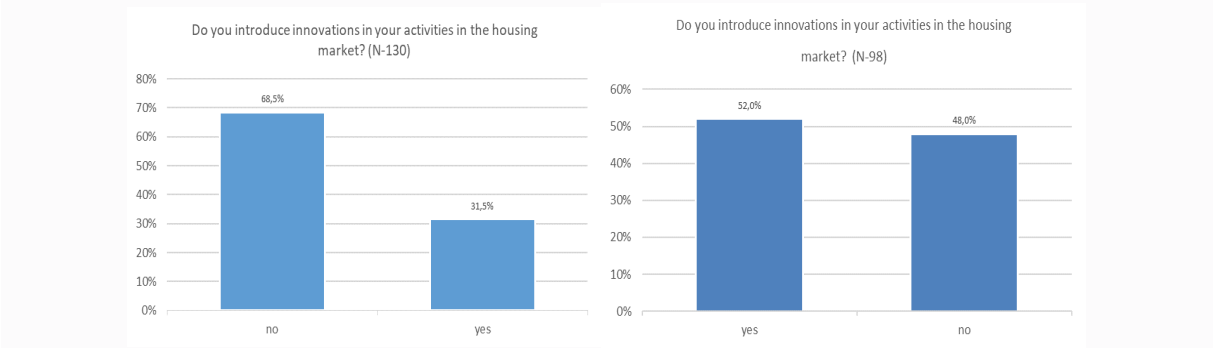
The survey of innovations among primary market residential developers in Poland in the context of company size and market range of the company's operations, motives for their implementation and changes that have taken place in this field in recent years was carried out based on surveys conducted using the CATI (computer-assisted telephone interviewing) method. The survey was not narrowed down to one group of developers, e.g. medium-sized companies, but small, medium-sized and large companies were surveyed, as the selection criterion was the capital strength of the companies, i.e. the implementation of large residential projects. It was decided to carry out such a survey because even developers classified as small enterprises carry out investment large projects in Poland, involving subcontractors in their projects. The survey was conducted twice at a 2-year interval.

Innovation surveys among residential construction companies in the primary market were conducted in August 2020 and in November 2022. The study was conducted on a nationwide sample. The first survey was conducted in August 2020 on a sample of 130 respondents with a then-identified total population of (±5%) 324 entities. This was followed by a further survey in October/November 2022 carried out using the same method on a sample of 98 respondents selected from a total population of (±5%) 230 entities. The research conducted allowed for the identification and analysis of developers' perceptions of innovation in the period before and after the outbreak of the war in Ukraine.

4. Results and Discussion

Preliminary analysis of survey data in the period 2020–2022 (Sitek 2020-2022; Sitek 2023a; Sitek 2023b) clearly indicated the influence of developers' market range on decisions to innovate.

This paper, based on the analysis of the 2020 and 2022 surveys, compared the actual readiness of developers to innovate in the residential property sector in Poland (figure 1)



a) survey 2020 b) survey 2022

Figure 1: Do you introduce innovations in your activities in the housing market?

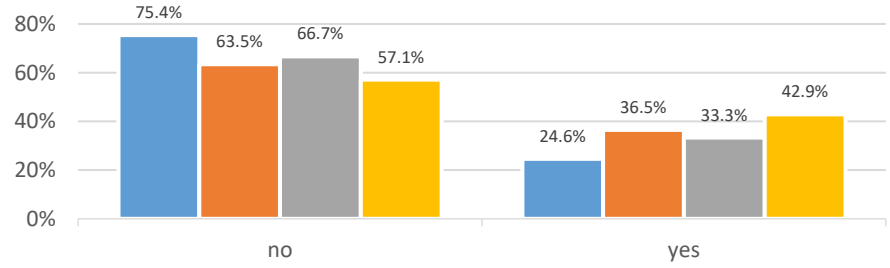
Source: author`s elaboration

The presented surveys showed that the low percentage of companies declaring to introduce innovations in 2020 resulted from three main factors as: the customers choose standard construction, translating into a lack of demand – 23.6%, preference for proven solutions – 22.5% and high costs of innovation – 15.7%.

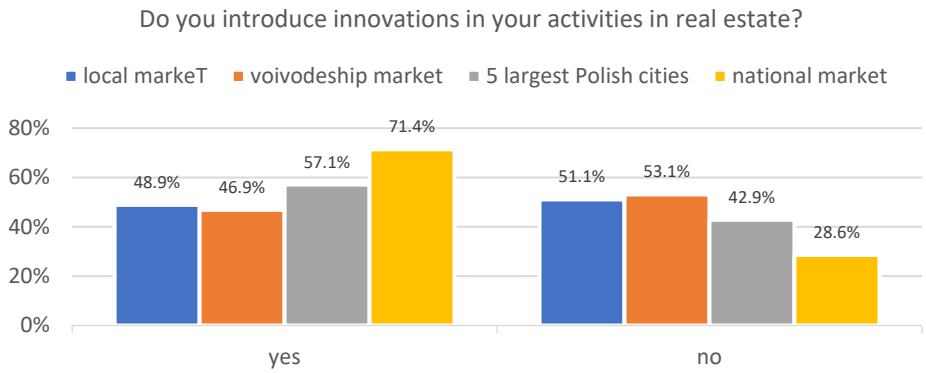
In 2022, on the other hand, developers identified, as the three main determinants of not implementing innovation in their business, the lack of need for it — 23.4%, the difficult market situation — 23.4% and the lack of innovative projects. This shows, first, that the awareness of the need to innovate on the part of residential developers is high, which increases the number of companies declaring innovation . Secondly, that despite the continued importance of the lack of demand/need and the preference for proven solutions in 2022, high investment costs are not shown to be one of the main determinants of the lack of innovation implementation. Whereas the drop in demand was caused by high inflation and consequently high interest rates and limited access to mortgage loans. The increase in costs, on the other hand, was caused by the high price of raw materials, which translated into higher prices for construction materials. On the one hand, there was a major increase in the price of coking coal and, consequently, steel, but also, on the other hand, the price of wood, which in Poland was imported in large quantities from Ukraine, among other countries.

It is impossible not to mention that the most important factor indicated by respondents in both surveys, i.e. the lack of need/demand, changed dramatically in July 2023 in connection with the enactment of the Energy Efficiency Directive. This directive imposes such a need, i.e. it determines the demand for sustainable construction, where buildings should be energy self-sufficient and even generate a surplus of energy obtained, obviously, from renewable sources.

When considering the introduction of innovations from the point of view of the range of activities of the analyzed entities, one can see a clear relationship presented in figure 2.



a) 2020 r.



b) 2022 r.

Figure 2: Do you introduce innovations in your activities in the housing market?

Source: author`s elaboration

It can be observed that both enterprises operating in a wide (nationwide) range and those operating in the five largest Polish cities are much more likely to introduce innovations than enterprises with a small (local) market range of activity. This confirms the general trend also presented in studies by Kilip and Owen (2020) who emphasize that companies operating locally usually do not use innovation, unlike companies with a larger market range. Moreover, firms with a local market range tend to be small companies operating more often in the market for retrofitting and refurbishment of existing space, while firms with a larger market range are larger and more often involved in projects in the primary market (COM 2019; European Climate Law 2021). In addition, the smallest companies, employing a few people, clearly indicate that they do not innovate in their activities, while those with larger employment are more likely to declare the implementation of innovations in their projects (figure 3).

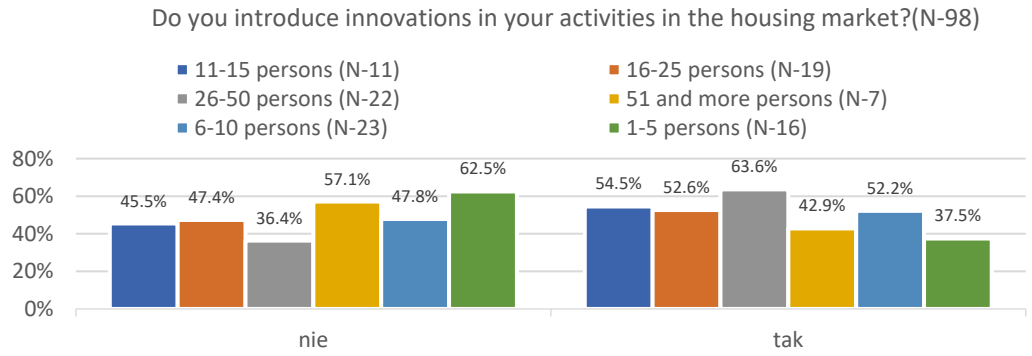


Figure 3: Do you introduce innovations in your activities in the housing market?

Source: author`s elaboration

They unanimously stated that the most frequently introduced innovations belonged to the category of technical and technological (product) innovations (36.52%), marketing innovations (32.17%), financial innovations (20%) and process and organizational innovations (11.3%). In 2020, the types of innovations used were as follows: technical and technological — 39%, marketing — 25%, and financial — 9%, with a surprising percentage of answers indicating process and organizational innovations — 27%. Invariably, the most important and also the most frequently applied innovations are those from the technical and technological category. This seems understandable given the fact that this group includes renewable energy sources or specific materials. It is this category of innovations that allows a real reduction in subsequent operating costs of the property, which is why customers pay attention to it. It can be concluded that in the situation of the implementation of EU regulations related to “Fit for 55”, the role of innovations from the technical and technological category will increase even further. Comparing the results received from respondents in the two surveys, it can still be seen that invariably the marketing innovation category is fairly often chosen by developers, which may be related to advances in showing the offered product using drones or virtual presentations to better showcase their property. The implementation of marketing innovations is relatively low-cost and produces tangible results. A clear difference can be seen in the implementation of financial innovations and process and organizational innovations presented in both surveys. In 2020, process and organizational innovations accounted for a large group with 27% of responses, while financial innovations accounted for 9%, which may have resulted from the fact that interest rates on loans were low at the time and thus access to conventional financing was good. In 2022, as already mentioned, respondents highlighted the difficult market situation, attributable to, among other things, weak demand associated with expensive loans. This situation could have been a reason to look for alternative ways of financing real estate, starting with offering long-term rentals and ultimately offering the option to buy the flat later.

In reference to the above, the importance of knowledge management in the process of implementing innovations should be emphasized. According to respondents' indications, technical and technological (product) innovations are the most frequently chosen and important innovations. However, introducing this type of innovation is a complex process that requires unique knowledge not only related to the innovation itself but also to its appropriate placement in the entire project. Errors in this area result in high costs. Therefore, developers need support not only in the process of acquiring and developing innovations but also in their proper management as part of green knowledge management.

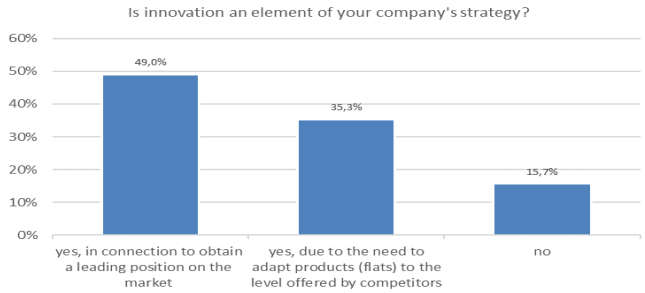


Figure 4: Is innovation an element of your company's strategy?

Source: author`s elaboration

The largest proportion of respondents (49%) stated that they incorporate innovation into their strategy in order to achieve market leadership, followed by (35.3%) indicating that they incorporate innovation in order to catch up with their competitors, while the smallest group (15.7%) does not incorporate any innovation into their strategies (figure 4).

Residential developers in Poland see the advantages of implementing innovations, and they see the risks of not implementing them, especially in the long term, and this is reflected in their strategies. Why, therefore, about half admitted that they do not implement innovations? It seems likely that the wider market has not exerted sufficient pressure on developers to use innovation to gain a more competitive advantage. Despite the rapid development of the real estate market, there is still a shortage of flats in Poland, which may be the reason for this situation. In addition, the process of implementing innovations is not easy and often unfamiliar to developers, which is why they do not reach for new solutions. This clearly indicates the need of knowledge transfer of appropriate innovation management and thus knowledge management. It can be concluded that developers want to introduce innovations, therefore obtaining appropriate competences in the field of knowledge management can facilitate and accelerate this process. In both surveys, the respondents clearly confirmed that the implementation of innovations causes difficulties in managing such projects (Figure 5).

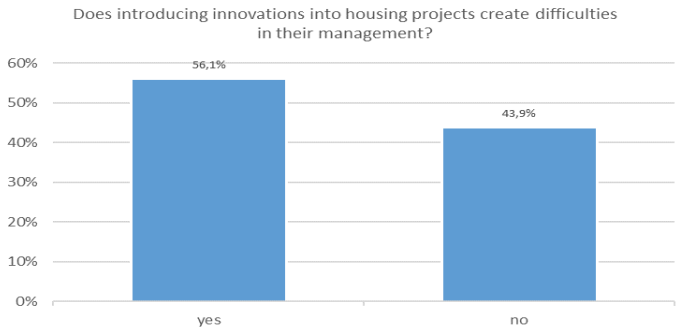


Figure 5: Does introducing innovations into housing projects create difficulties in their management?

Source: author`s elaboration

In conclusion, developers in Poland point to clear problems in managing innovative projects. Over the two years separating the two surveys, this state of affairs hardly changed. On the other hand, the EU-initiated legal changes described in the literature review will confront developers with the requirement of implementing innovation in their projects. This will not happen immediately, but over the next few years, which is not a long period in the real estate market. Therefore, developers should adapt as quickly as possible to future changes, not only in the area of innovation project management, but also in the area of innovation creation, knowledge and implementation. Here, a significant role can be played by support from the state and the EU, which is developing tools, for example, to finance such activities. Developers themselves have indicated that in order to develop innovative activities on the market in Poland, they need help from other external entities, especially public ones.

This leads to the conclusion that assistance, especially in the creation and development of innovations, should be directed to research centers and universities, which in cooperation with companies would create innovations addressed to business.

5. Conclusion

The conducted survey showed that:

- Findings about the number of residential developers with the appropriate capital strength to carry out projects for the construction of multifamily multi-storey residential properties in Poland have shown that there were fewer such enterprises in 2022 than in 2020 (by 44 entities), which may have been caused by difficult market conditions following the outbreak of war in Ukraine.
- Despite a decrease in the number of selected entities, in the general population an increase was observed in the number of developers declaring that they were introducing innovations. This shows the positive direction of the Polish residential market and the awareness of the importance of innovation among developers.
- A higher number of developers introducing innovation was observed in the group of companies operating in a broad market in geographical terms than those operating locally. This may reflect the greater importance of innovation in a situation where there is a need to compete on a broad market, or the market of the largest Polish cities.
- The persistently high percentage of developers not innovating in their business is primarily determined by a lack of demand/need for innovation. In 2022, respondents also pointed to difficult market conditions as a reason for not innovating. In the context of the described changes related to the "Fit for 55" package and the directives being enacted, it can be concluded that the primary determinant, i.e. the lack of need to innovate, has changed by 180 degrees.
- Invariably, the most important and also the most frequently applied innovations are those from the technical and technological category. This is understandable given that this group includes renewable energy sources, specific materials or construction techniques.
- Respondents indicate that a lack of innovation increases the risk of bankruptcy, which is why they include elements of innovation in their strategies. Gaining a competitive advantage and thus a leading position in the market was identified as the main factor for including innovation in strategies.
- Respondents declare that innovation creates problems in the management of development projects. Therefore, the development of knowledge and support, and the transfer of know-how of the management process in innovative projects seems to be important. In this case, the development of knowledge about green knowledge management seems crucial.
- Respondents clearly indicate the need for adequate support in the process of innovation implementation, from external, and especially public, entities. Although the EU is trying to create tools to support innovativeness, it is evident that a systemic change is needed at the level of the state, i.e. Poland.
- It should be emphasized that the most important action to be taken in this situation is identifying the needs of developers in the innovation implementation process in the context of providing them with adequate support and preparing them for the implementation of innovative projects that can meet current and future requirements of sustainable development.

In conclusion, it should be stated that the introduction of innovation into the real estate market is becoming a necessity in European Union countries due to regulations aimed not only at increasing the competitiveness of EU economies through increased innovation but, above all, at achieving sustainable development goals — including net-zero carbon emissions — introduced under the Green Deal, and "Fit for 55". These regulations introduce strict requirements concerning, among other things, the energy performance of buildings, which will result in the need for innovative projects not only in the primary market but also for projects aimed at modernizing the existing stock (secondary market), which, according to research, is often carried out by smaller companies that have not yet applied innovative solutions in their operations. In this context, it can be concluded that it is important to investigate the needs of the smallest enterprises in introducing innovations, and the role of green knowledge management in this process which sets the direction for future research.

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