

ANALYSIS OF ENVIRONMENTALLY CERTIFIED RESIDENTIAL DEVELOPMENTS IN POLAND

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ARTICLE INFO	ABSTRACT
<p>Keywords: multi-criteria building rating systems, green (low carbon) construction, environmental certification, real estate market</p> <p>JEL Classification: R11, R39</p>	<p>The scale of environmental pressure caused by the construction sector has prompted a search for new technical solutions to minimize the negative impact of this part of the national economy on the environment. The drive to evaluate the adopted solutions has led to the creation of building assessment systems - environmental certificates.</p> <p>The aim of the article is both to introduce the certification processes used in the Polish residential property market and to indicate the locations of residential investments that have obtained the certificates in question. The paper takes a closer look at environmental certification using multi-criteria building assessment systems, i.e. BREEAM, LEED and HQE. The time scope of the presented research covered the years 2016 to the first quarter of 2022. The research carried out allowed an upward trend to be observed in the number of environmental certificates awarded, indicating the use of green building principles for residential properties. It is certain that there has been a development of this type of investment in Poland in the recent years. An analysis of the spatial distribution of the surveyed investments shows that location clusters have formed - green (low-emission) residential investments are distributed in the largest cities in Poland, which are characterized by a strictly defined consumer profile.</p>
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1. Introduction

In European Union countries, the highest energy consumption – apart from the high-tech industry – is generated by the construction sector. It should be emphasized that this sector is responsible for approx. 40% of total energy consumption and stands out – negatively – in terms of greenhouse gas emissions (Janicka, 2014). Research results presented in the report “Greening The Building Supply Chain” indicate that the construction sector is responsible for generating approx. 30-40% of the total greenhouse gas emissions on the globe (www.unep.org).

The phenomenon is so alarming that the Parliament of the European Union and the Council of the European Union, seeking to stem the climate crisis, imposed the obligation to implement the principles of sustainable development in the construction sector on the Member States. Obviously, this aspiration is

consistent with the idea of the “Fit for 55” package adopting the reduction of greenhouse emissions in the EU by at least 55% by 2030 (www.consilium.europa.eu). Directive 2010/31/EU of the European Parliament and of the Council of 19 May 2010 on the energy performance of buildings is the legal act directly supporting the idea of green construction. Pursuant to Article 2(2) of the above-mentioned Directive, a building with nearly zero energy demand is “a building with very high energy performance (...) The near-zero or very low amount of energy required should be provided to a very high degree by energy from renewable sources, including renewable energy produced on-site or in the vicinity” (Official Journal EU No. L 153/13). Pursuant to the adopted legal regulations, ecological buildings are to become a binding standard in the European countries from 2022 (Furtak et al., 2021). A kind of revolution in

construction is aimed not only at improving the condition of the environment, but also at a better quality of life experienced by the population – both of these values are connected with each other. The regulations are intended to effectively reduce carbon dioxide emissions from the existing building stock. In all EU Member States, legal regulations have to be followed, e.g., Directive of the European Parliament and of the Council No. 2010/31/EU of 19 May 2010 on the energy performance of buildings (Fuerst & McAllister, 2011). In European Union legislation and at the national level, there are many other environmental regulations related to sustainable construction.

As a result of the above, criteria the fulfilment of which entitles the property to be granted the status of an environmentally friendly building were defined (Biała, 2020). The environmental certification related to this procedure covers activities in the field of design, construction, use of the building, energy efficiency and the impact of the building on the immediate surroundings throughout its life cycle (Yang, 2013). Green building practices are not new to the residential real estate market of highly developed countries – there are many organizations offering environmental certification of developments based on individual rules. It should be noted that the problem of sustainable construction has also been noticed by Russia (Kopeva et al., 2018) and China (Aydin et al., 2020).

Therefore, the question about the perception of the environmental certification of buildings in Poland – one of the largest European countries – is becoming increasingly important. The Polish residential real estate market is discovering environmental certification – increased interest in this area has been observed for several years (Mokrzecka, 2015). Undoubtedly, the Act of August 29, 2014 on the energy performance of buildings (Journal of Laws 2021 item 497) was also an important impulse for the development of the described phenomenon. Currently, these certificates are obligatory in the process of real estate sale or rental, and the intention of the legislator is to increase public awareness of the possibilities for obtaining energy savings in buildings.

In Poland, until the end of 2021, construction facilities on the residential real estate market were certified in three multi-criteria certification systems: Building Research Establishment Environmental Assessment Method (BREEAM), Leadership in Energy and Environmental Design (LEED), and High Quality Environmental (HQE). In Poland, the database of

buildings that have been granted environmental certification is developed by the Polish Green Building Council (PLGBC). PLGBC is a non-profit non-governmental organization which brings together entities from the construction and real estate sectors. Its task is to promote the principles of sustainable development in both areas.

The purpose of the article is to present the certification processes used on the Polish residential real estate market and also to indicate the locations of residential investments which have obtained the certificates in question.

The study addresses environmental certification using multi-criteria assessment systems for buildings, i.e. BREEAM, LEED and HQE. The decision to choose these certification systems was taken based on their popularity and recognition gained worldwide.

2. Material and methods

The first stage of the research work included a library and legal search. It should be noted that, in the realities of the Polish real estate market, environmental certification is not a common phenomenon. The research focused on a submarket of the Polish real estate market - the residential property segment. For the period 2016 - Q1 2022, data on the number of certificates summoned was collected. On this basis, a database was created to enable analyses leading to fulfilling the objectives of the study.

The main objective was to obtain comprehensive information on environmentally certified housing investments in Poland. As a complement, the following three specific objectives were detailed:

1. introduction of selected concepts related to the subject of the study - a definition of green (low carbon) construction and environmental certification was sought,
2. familiarization with the systems used in Poland for real estate certification,
3. identification of the location of certified housing developments.

The following research methods were used: library search, statistical analysis, analysis of legal documents and analysis of reports. When creating the theoretical and empirical part, the indirect observation method was applied. The following data sources were used: a database of certified buildings created by the Polish Green Building Council, publicly available sources on the Internet (including expert reports) and CSO data.

3. Results

3.1. Green (low carbon) construction - definitional considerations

With the growing awareness of environmental protection, there has been a rapid development of pro-environmental trends in the real estate sector. This is consistent with the trends in sectors related to real estate – the insurance sector is increasingly paying attention to climate problems and their consequences, e.g., hurricanes, floods, which are, after all, important for the functioning of real estate (Elliott, 2021). Green industry is perceived as a determinant of the future development related not only to industry but also to real estate (De Silva et al., 2017).

The environmental performance of a building has become one of the investment metrics in the real estate market (Cichoń, 2010). Consequently, the need for definitional terms in the field of sustainable investments in the building sector has emerged. Many terms, used as synonyms, can be found in the literature, among others: "green building", "sustainable building", "low carbon building", "green building" or "energy efficient building".

It is noteworthy to propose defining a "green building" as a multidimensional concept, referring to three dimensions: technological-technical, environmental and social. The technological-technical

dimension refers to the building technology used, mainly type of construction and materials used. The area of construction must meet a number of mandatory criteria that seek to improve the environment (Lewandowska, Rogatka and Wylon, 2019). The building technology used in practice should increase the energy efficiency of the building. Its increase is possible by using the highest quality building materials for thermal insulation. In green building, modern design techniques should be implemented that will contribute to a reduction in utility costs (Janicka, 2014; Kim et al., 2014). It is assumed that the energy used in a green building should be generated locally from renewable energy sources. Thus, the building should be equipped with power generation equipment such as photovoltaic panels or windmills, among others (Furtak et al., 2021). Listed as the second environmental aspect is the impact of the building facility on the immediate natural surroundings. The design of a green development should propose solutions that make the most of existing greenery, e.g. "vertical walls with greenery". Vertical walls covered with living plants should not only be used in newly constructed buildings - the National Museum in Wrocław is worth noting in this context (Fig. 1, 2).



Fig. 1. National Museum in Wrocław. Source: *File:Wrocław, National Museum (view from tram stop).jpg - Wikimedia Commons (Accessed: 03.03.2023).*

The last - social - aspect draws attention to the fact that buildings included in green building should have a positive impact on the comfort and quality of life of their users and the neighbourhood.

To summarize the above considerations, the following definition of "green buildings" may be



Fig. 2. National Museum in Wrocław - leafless period. Source: *Author's private archive.*

proposed - these are buildings which, in the process of planning, construction and use, minimize negative impacts on the natural environment, positively influencing the comfort of life of their users and users of neighboring spaces.

3.2. Environmental certification - presentation of selected solutions

The proliferation of green building solutions has prompted many countries and international organizations to develop individual building assessment systems. A sustainability assessment tool in the real estate sector is defined as an environmental certificate (Lewandowska et al., 2019). It is a set of direct principles and criteria for assessing sustainability (Sirazetdinov et al., 2018). Environmental certification, as defined by Nguyen and Altan, is a tool not only to assess, but also to promote and improve environmental solutions (Nguyen & Altan, 2011). The introduction of the certification system has increased the scrutiny in the market towards the quality of goods, construction products, techniques and solutions. Although there are more than a dozen systems for assessing the environmental impact of a building, each assesses individual criteria in the same three aspects, i.e. environmental, social and economic (Awadh, 2017). The variation lies in the extent to which a particular system emphasizes each element of the green building definition (Janicka, 2014).

Evaluating a building in a multi-criteria certification system is a complex process that takes into account energy efficiency, the low carbon performance of building materials used, technological solutions that minimize water consumption and waste generation (White, 2020).

The UK was the first to introduce its own building certification system as early as 1990. This system was called the Building Research Establishment Environmental Assessment Method (BREEAM) (Jurczak et al., 2021), and the coordinating and awarding body for certification was the Building Research Establishment (BRE) (Mokrzecka, 2015). The criteria for assessing a building's environmental impact in BREEAM are based on UK and EU environmental regulations (Janicka, 2014). BREEAM is actively used in 77 countries - in European countries, it is voluntary, but in the United Kingdom and Northern Ireland, all newly designed developments or retrofits have been required to use it since 2019 (Juchimiuk, 2011).

The UK system distinguishes between several certification schemes:

- BREEAM International New Construction 2016 certification assessment for a newly constructed building,
- BREEAM International In - Use Residential Version6 - certification assessment for existing buildings and in use for a minimum of two

years,

- BREEAM International Refurbishment & Fit - Out 2015 certification assessment for building refurbishment and fit-out,
- BREEAM Communities 2012 assessment for urban projects.

The Brits were followed by US researchers David Gottfried, Mike Italiano and Rick Fedrizzi, who formed the U.S. Green Building Council in 1993. In 1998, the organization launched its own certification system called Leadership in Energy and Environmental Design (LEED). Today, the multi-criteria building rating system is managed by Green Business Certification (GBCI). The LEED system was developed to identify the cause of a building's negative environmental impact and to implement practical solutions to eliminate its negative effects. It covers the design, construction, operation and maintenance phases of green properties (Lewandowska, Rogatka and Wylon, 2019). The LEED system bases its standards on the current performance standards of the American Society of Heating, Refrigerating and Air Conditioning Engineers. A number of significant changes to LEED over a period of twenty years have resulted in the American system now being the most popular certification in the world. The LEED rating scheme is used in more than 160 countries. Leadership in Energy and Environmental Design (LEED) is considered to be the most superior building rating system. According to many experts, LEED is the most effective and influential (Janicka, 2014).

The French High Quality Environmental (HQE) green building rating system emerged on the real estate market in 2012. The managing organization in France is a stakeholder group of public service organizations operating under the name GBC Alliance HQE (Isimbi and Park, 2022). In other countries, the managing organization of the HQE scheme is the international certification operator Cerway (Delta Controls, 2021). The aim of HQE certification is to spread environmental awareness and ideas in the construction and urban planning sector. The applicable criteria in the HQE multi-criteria building rating system are based on research developed by the Scientific and Technical Centre for Buildings (CSTB) and Qualitel (Isimbi & Park, 2022).

The first environmental certification schemes began to be introduced in countries with a high level of economic development, where stricter environmental regulations were in place. Certification of green residential developments has become

common practice in Scandinavian countries, including Finland, Norway and Sweden (Janicka, 2014).

It is worth comparing how environmental

assessment systems - certificates differ in their attributes and the scale of their assessments, as shown in the table below (Table 1).

Table 1

Comparison of environmental certification schemes for residential buildings in Poland

	BREEAM	LEED	HQE
Country of origin	United Kingdom	United States	France
Certification organisation	Building Research Establishment	U.S. Green Building Council	Cerway
Scope of the assessment	Multi-criteria	Multi-criteria	Multi-criteria
Cost of certification	Fixed certification fee (dependent on area range) Registration fee: 250–1850 GBP, administration fees: 330–4900 GBP. Consultancy costs determined on an individual basis.	Registration, certification and recertification fee (according to the USGBC tariff) Registration fee: 900\$, certification fee: from 2000 to 22.000\$. Consultancy costs determined on an individual basis.	Cost of certification (0.3 % of construction costs) Indirect costs (0.2-0.4% of construction costs)
Expiry date of certification	Unlimited (Exception: BREEAM In Use)	Unlimited (Exception: existing LEED EB O+M buildings)	Unlimited
Applicable legal standards	National and partly British	National and US ASHARE	National
Objective	Benefits for all participants in certification. Reduction of negative environmental impacts. Sustainable management that strives to save energy and water consumption during building operation	Improving the environment by choosing environmentally friendly building materials. Emphasis on lowering building operating costs, reducing CO ₂ emissions and optimising energy consumption.	Improving the environment and user comfort. Emphasis on the economic aspect
Highest scoring category	Energy 34 points 19% of the total	Energy and atmosphere 33 points 30% of the total	Even distribution of points (four points are allocated to each category)
Start of certification	Willingness to apply for certification. Employment of a BREEAM Assessor	Willingness to apply for certification. Hiring a LEED AP consultant	Conclusion of the agreement between the Investor and Cerway
Mandatory requirements	Yes	Yes	Yes
Additional points	Innovations +10 points	Innovation +6 points Regional priority +4 points	No
Minimum number of points for certification	≥ 30 points (Pass)	40 points (Certified)	Fulfilment of the six prerequisites (Pass)
Consultant	BREEAM Licensed Assessor (compulsory)	LEED AP accredited (compulsory) Commissioning Authority CA (voluntary)	Licensed Auditor (compulsory) HQE reference (voluntary)

Source: own study.

The HQE system, unlike the other two certifications, takes into account changes in the profile and management patterns. It allows strictly defined assumptions to be adapted to the regulations in force in the local investment market. The BREEAM and LEED systems, due to their prestige in the construction industry, take into account more variables in the assessment than the French HQE system. The variables are based on environmental, social 40 and economic assumptions that seek to benefit investors and users. In BREEAM and HQE, the environmental aspect is as important as the economic aspect. LEED, in contrast to the British and French systems, ignores the economic

factor. In the American system, ecology takes priority. In the two multi-criteria building evaluation systems cited, the certification process begins with the desire to apply for certification. The start of the certification process for an investment with the French eco-label begins with the signing of a contract with the supervising organization. In the characterized systems, the certification process involves a consultant who is assigned by the supervising organization. The consultants' role is to assist in obtaining environmental certification in the chosen system. In BREEAM and LEED, consultants are responsible for assessing the building. They verify that the building in

question reduces climate change by increasing energy efficiency. In the French HQE certification, on the other hand, a licensed auditor is required to assess the building, and a HQE desk officer assists with the organization of the work. The environmental certification of a building in the compared systems is voluntary but chargeable. The cost of the certification process varies from system to system. According to the estimates made, the cost of BREEAM certification was found to be the lowest. Unlike the American and French building assessment systems, it is possible to obtain pre-certification in the BREEAM system. Of the analyzed schemes, only BREEAM allows pre-certification.

It should be emphasized once again that the systems described above are not the only ones used throughout the world. There are many other certification methods e.g.: CASBEE (Comprehensive Assessment System for Built Environment Efficiency) in Japan, GBTool (Green Building Tool) in Canada) and Life-cycle-based tools (e.g., Eco-Quantum in the Netherlands, EcoEffect in Sweden, ENVEST (Environmental impact analysis for buildings) in the UK, BEES (Building for Environmental and Economic Sustainability) in the USA, ATHENA (Athena Sustainable Materials Institute Life Cycle Assessment Tools) in Canada, and LCA (Lifecycle Assessment) House in Finland (Tupenaite et al., 2017). Despite the dominance of the three described systems, experts continue to draw attention to the need to place greater emphasis on a holistic approach that seeks to balance the environmental, social, economic and

institutional dimensions of sustainability; at the same time, it includes an integrated concept of the building–community–locality (Adamec et al., 2021). Therefore, appropriate modifications can be expected in the future.

3.3. The housing market with environmental certification in Poland

The level of interest in certification on the Polish real estate market is realistically illustrated by the usable area of certified investments, which, in Poland, amounts to almost 30 million m². This value consists of the share of several types of real estate (order according to the share of certified area): office buildings, warehouse-industrial buildings, retail buildings, residential buildings and hotels and schools. The area of certified residential buildings amounts to 438,660 m², which translates into a share of approximately 2% of the surveyed area (Kuczera, 2022).

Compared to Western countries, the Polish market for certified residential properties took a long time to make its debut - it was only in 2016 that the first certificate was awarded. On the positive side, from 2019 onwards, it records a clear increase in the number of certificates awarded for buildings meeting residential needs (see Fig. 3). It is important not to confuse the number of certificates awarded with the number of certified buildings - one certificate can cover a complex of several or even dozens of buildings.

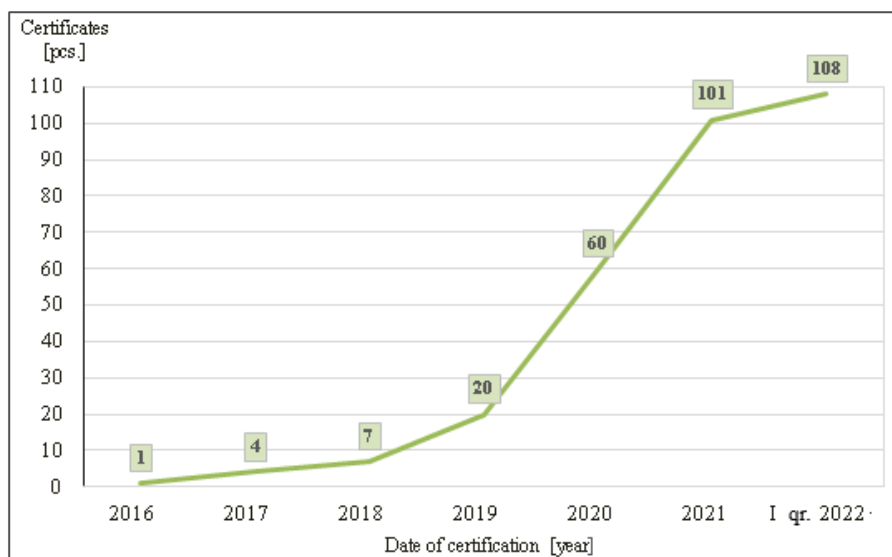


Fig. 3. Number of certified residential developments in Poland. *Source:* own study.

Table 2

Date certification	The number of certificates by note per year in Poland			LEED Gold	HQE	
	BREEAM Pass	BREEAM Good	BREEAM Very Good		Very Good	Excellent
2016 y.	-	-	-	-	1	-
2017 y.	-	3	-	-	-	-
2018 y.	-	-	-	-	3	-
2019 y.	6	4	2	-	-	1
2020 y.	6	22	5	7	-	-
2021 y.	-	21	20	-	-	-
Q1 2022	-	2	5	-	-	-
Total	12	52	32	7	4	1

Source: own study.



Fig. 4. Number of certified residential developments in Poland. Source: own study.

When assessing the certified real estate market, in addition to determining the number of certification processes, it is very important to pay attention to the choice of certification system and the final grade obtained (Taczalska-Ryniak, 2019). Three certification systems are used in the Polish residential real estate market: BREEAM, LEED and HQE - with the British BREEAM system playing a dominant role (see Tab. 2.).

The American LEED system has not generated as much interest among investors as BREEAM. So far, only one developer has decided to incorporate the green solutions promoted by LEED into the project design. The project consisted of seven buildings with

residential functions. In the Polish residential sector, LEED certificates account for less than 7.5% of the total certificates awarded. Of the 108 certified residential developments, only five are assessed using the HQE system. However, it is worth noting that the first residential complex in Poland was certified using the French HQE system.

Each of the three certification systems operating on the Polish residential market specifies levels of building certification. Significantly, certified residential developments in Poland are characterized by very high scores - the vast majority obtain certification at the level of „good and very good”. This demonstrates

the increasing awareness of participants in the certification process (from the design stage to commissioning) and the high quality of construction (Taczalska-Ryniak, 2019).

The spatial distribution shows that certified residential developments are located in the largest urban centers in the country, i.e. (alphabetically) in Gdańsk, Katowice, Kraków, Łódź, Warsaw and Wrocław (see Fig. 4).

The Warsaw real estate market is the unquestionable leader among certified residential developments - it is in this capital city where 93 out of 108 surveyed investments were located. The real estate market in Gdańsk offers 11 certified investments, with only one investment certified in each of the remaining four cities. Certified residential developments in Katowice, Kraków, Łódź and Wrocław constitute a marginal part of the surveyed set. However, it can be concluded that the market in these cities is only just absorbing innovative,

environmentally-friendly building solutions. Investments in the Lower Silesian, Małopolskie and Silesian Voivodeships, were certified in Q3 2021. However, in the capital of the Łódzkie Voivodeship, a residential building was certified in 2020.

Certified residential developments stand out in terms of the materials used, the spatial planning of the development as well as in the final value of the property (Jański, 2021). It can be noted that the characteristics of the surveyed properties make them targeted at the more affluent customer segment, guided not only by the principle of price minimization when buying a good, but also paying attention to the quality and prestige of that good. In the Warsaw market of certified properties, which is the most developed in Poland, it is observed that the surveyed properties are not only favourably located in terms of communication, but also surrounded by green areas (see Fig. 5).



Fig. 5. Certified residential developments located in Warsaw's districts. Source: own study.

4 Discussion

It is worth remembering that in the Polish real estate market, at the end of Q1 2022, 1,359 buildings were environmentally certified (not to be confused with the number of certificates granted for investments). A discussion on the number of certified buildings in Poland should not be referred so much to the results of studies conducted in the past, as the certification phenomenon does not have a long history in Poland, but to the situation taking place in the CEE region and developed countries. Poland is the clear leader in the region - in 18 countries located in the aforementioned part of the continent, a total of approximately 3,000 properties have been certified, which means that Polish investments account for as much as 45% of this set (Kuczera, 2022). The numerous certifications of buildings in Poland show that the environmental awareness of the most important groups of real estate market stakeholders, i.e. architects, investors and users, is increasing. Statistics relating to the number of green buildings in Poland indicate that the Polish market draws inspiration from the US market, which is considered the leader in eco-building (Kuczera, 2018). On the territory of the United States, more than 124,000 buildings are considered green according to the evaluation of the LEED scheme. It can be presumed that the Polish construction sector is trying to join the leaders in green building - although, unlike the US real estate market, the Polish market is dominated by the BREEAM scheme. A list of the number of LEED certified buildings worldwide identifies five leaders in this field (see Table 3) (Cassells, 2021; www.uswitch.com/gas-electricity/global-green-building-leaders/). Undoubtedly, these are countries with internationally prominent national economies.

Table 3

Countries with the most LEED certified buildings

Lp.	State	Number of LEED certified buildings
1.	United States	124 212
2.	China	5 678
3.	Canada	3 066
4.	India	2 246
5.	United Arab Emirates	2 029

Source: own study based on (USWITCH, 2023).

More and more buildings are being certified in Poland - a trend that should clearly be regarded as positive. Office buildings, warehousing and industrial facilities, commercial buildings, residential buildings, hotels and schools can all apply for the environmental

label. Although earlier discussed international multi-criteria building assessment systems, i.e. BREEAM, LEED and HQE, are used in Poland, it should be mentioned that, in addition to the aforementioned, there is also the Polish Green Building Standard (GBS) certification system and the German Deutsche Gesellschaft für Nachhaltiges Bauen (DGNB) (Kuczera, 2018). The aforementioned schemes do not enjoy practical application, and it therefore makes sense for other countries to stop creating their own proposals and to focus on existing, widely used, certificates. However, it is worth considering specifying the requirements for certified buildings, as there are doubts in the literature regarding the merits, i.e. the fact of energy saving (Scofield, 2009).

When evaluating the certification process, one has to agree with the experts - the Polish residential property market is responding to the challenges. For the last few years, the Polish construction industry has also started to respond to the demands related to the trend of using energy from renewable sources (Kontkiewicz-Studzińska and Nogaj, 2019). At the same time, it cannot be overlooked that sustainable design has been introduced relatively recently in Poland. Green building certification in recent years has been mainly associated with a number of mandatory standards, high investment costs and technological innovations. Mistakenly, only environmental aspects were referred to without paying attention to the socio-economic zone (Jurczak et al., 2021). This conclusion is particularly important from the point of view of the conclusions published already in 2003 and relating to the reasons for the decision to choose green construction in developed countries - developers and residents need financial incentives (White Paper on Sustainability, 2003). The need to take into account the economic sphere in the process of disseminating building certification is also emphasized by the findings relating to the Chinese economy - the level of development of the local economy was recognized as one of the four key success factors in this area (Yang et al., 2018).

There is, therefore, a continuing need for further analysis to understand the changing dynamics of the local property market (Kohler and Rydholm, 2021), all the more so that studies on other national economies indicate the importance of political conditions in the evolution of the real estate market (Coma Bassas et al., 2020). Concluding the discussion, it is worth emphasizing one more important aspect - parallel to the increase in awareness of the real estate market,

there is increased interest in issues of natural disasters and their economic effects, as well as the scale of damage they cause in real estate (Piepiora et al., 2016; Piepiora, 2019).

5. Conclusions

The most important conclusion from the research is that the development of certified construction in Poland should be assessed positively. In the period under review, a steady increase in green buildings is noticeable, and Poland is the leader of Central and Eastern Europe in the area under review. The conducted research also shows the following findings:

1. There is no single definition of green (low-emission) construction and environmental certification - these concepts are too complex.
2. Education in the field of green (low-emission) construction is absolutely necessary. Experts emphasize that training programs aimed at builders, investors and users have had a significant impact on the development of the housing certification phenomenon (Kuczera, 2018). It should therefore be acknowledged that educational activities in this area are an important issue - they also change consumer preferences.
3. The creation of national environmental certificates should be abandoned. In Poland, internationally recognized multi-criteria building assessment systems are used, i.e. BREEAM, LEED and HQE – with the British BREEAM environmental certification system playing a dominant role. Neither the Polish Green Building Standard (GBS) nor the German Deutsche Gesellschaft für Nachhaltiges Bauen (DGNB) certification system have found practical application.
4. Environmentally friendly construction in Poland only occurs in metropolitan areas. The Warsaw real estate market is clearly dominant in the scope studied. The country's other leading urban centers are only just beginning to build an offer of certified buildings. This shows that the Polish real estate market is gradually introducing changes that depend on the prestige of the location and economic factors.

In conclusion, it should be emphasized that the development of construction - like any other branch of the national economy - has been conditioned by the prevailing political and legal conditions. Legal norms guide spatial planning, the type of materials

used, the planning permissions, and the health as well as safety of residents (Lewandowska, Rogatek and Wylon, 2019). Therefore, the law is an important element of the environment affecting changes in the research area.

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