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Greening Shopping Centers in Supply Chains: Polish Experiences with Particular Emphasis on Multi-Criteria Certification

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Abstract:

Purpose: *The main objective of this article is to identify the circumstances and current state of development of multi-criteria certification of shopping centers in Poland in the context of other solutions related to the greening of resources in the modern retail space market in view of contemporary regulatory challenges, customer expectations, and other stakeholders operating within green supply chains.*

Design/Methodology/Approach: *In order to achieve the main objective of the paper, secondary sources of information were mainly used. Literature on green buildings and green supply chain management was analysed. In addition, the study used reports on the development of the modern retail space market, mainly the shopping centre market in Poland, as well as data from consulting and real estate agencies. To achieve the objective, selected legal acts relating to the issue in question were also utilised. An in-depth analysis of numerous annual reports by the Polish Green Building Council on sustainable, certified buildings was also carried out.*

Findings: *The results of the study indicate that the market for modern retail space in Poland is developing steadily and currently stands at approximately 15 million square metres. Various stakeholders are interested in green initiatives, including multi-criteria certification of buildings. These solutions are either introduced voluntarily or result from applicable legal regulations. Multi-criteria certification of retail facilities has been carried out in Poland for over a decade, with the share of certified facilities exceeding 50% for several years now, and BREEAM being the dominant certification scheme. Among the various retail formats, the certification of shopping centres and outlet centres, the larger ones with a GLA of over 40,000 sqm, dominates.*

Practical Implications: *An analysis of secondary sources has identified practical implications for the development of the shopping centre market in Poland in the context of the need to green resources. Attention was drawn to solutions and trends in the development of certified commercial facilities, while other environmentally friendly practices were also identified. This approach is important for various stakeholders in the market in question who are looking for solutions in connection with the emergence of environmental requirements within supply chains.*

Originality/Value: *This article attempts to identify ways of greening the resources of the shopping centre market in Poland, taking into account the solution of multi-criteria*

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certification of buildings. The study, which reflects the specific nature of the market for the facilities in question, aims to enrich the literature on the subject with theoretical and practical aspects.

Keywords: *Green building, shopping centers, multi-criteria (green) certification, supply chain management.*

JEL Classification: *D49, K29, L89.*

Paper type: *Research paper.*

1. Introduction

The issue of greening supply chains is discussed in the literature on the subject by many authors, taking into account the various stages of their functioning and in relation to the activities of the various entities that make up these chains. It is worth noting that greening is a process of striving for an increasingly significant degree of environmentalisation of the supply chain, or, in broader terms, its sustainability.

This article addresses the issue of greening shopping centres as important buildings functioning within the structures of modern supply chains. It is in these centres that important processes (for the purpose of these chains) such as purchasing or receiving products by customers take place.

Customers should feel comfortable here, because nowadays, on the one hand, the role of shopping centres is evolving towards places for spending free time and meeting people, and on the other hand, their existence is somewhat threatened by the intensive development of e-commerce.

However, the operation of commercial buildings is also becoming a significant burden on the environment. It is estimated that, overall, buildings in the EU account for 40% of final energy consumption and 36% of EU energy-related greenhouse gas emissions. At the same time, it should be emphasised that 75% of buildings in the EU are still energy inefficient (Directive (EU) 2024/1275).

Retail property owners, developers and tenants today face the challenge of how to reduce their carbon footprint and improve the efficiency of their properties while ensuring their functionality and providing a pleasant environment for consumers (Niemira-Jurek, 2025).

In this regard, a whole range of multidimensional solutions is being introduced, among which multi-criteria building certification systems play a significant role.

2. Literature Review – Greening Shopping Centers and Multi-Criteria Certification Issues

2.1 Green Shopping Centers - Areas of Analysis

The literature contains many studies on greening supply chains at various stages through the use of 'green' buildings (warehouses or retail facilities) and related issues (Hwang, Shan, and Supa'at. 2017; Samosir, 2021; Miklinska, 2022).

There is great potential for this type of activity in the distribution of products within the so-called last mile and in the use of various commercial facilities in brick-and-mortar retail, including shopping centres, where green or sustainable solutions are applied.

Shopping centres are an important point of contact between sellers and buyers. In addition, they now also perform these functions for products sold online – in the case of click & collect solutions, where goods purchased online are collected from a brick-and-mortar store in a shopping centre. In this case, these facilities compete, in a sense, with solutions found in e-commerce supply chains, such as parcel machines and other parcel delivery and collection points.

From the point of view of the issue in question, it should be noted that shopping centres are commercial facilities that are visited by a large number of people every day, including both customers and employees. This situation creates a need for large spaces, adequate passageways, and heating, ventilation and lighting systems (Niemira-Jurek, 2025).

In addition, due to the operation of retail, service and catering premises, there is high energy consumption (Niemira-Jurek, 2025) and large amounts of waste. These commercial facilities are also specific generators of traffic, due to the need to reach them. Hence, the issue of greening shopping centres is such a topical one.

Solutions for greening shopping centers have been introduced over the years, both voluntarily, to make these facilities more attractive and competitive, and in response to emerging legal regulations.

The list of such measures is long, and new initiatives are constantly emerging. The literature on shopping buildings identifies six main criteria for green building assessment: "Appropriate land development or Appropriate Site Development (ASD); Energy efficiency and conservation (Energy Efficiency and Conservation, EEC); Water Conservation or Water Conservation (WAC); Material and cycle resources or Material Resources and Cycle (MRC); Health and comfort of the room or Indoor Health and Comfort (IHC); Management of the space environment or Building Environment Management (BEM)" (Samosir, 2021).

Over the years, EU regulations concerning ESG have been introduced, which also affect various aspects of building operation. Recently, Directive (EU) 2024/1275 of the European Parliament and of the Council of 24 April 2024 on the energy performance of buildings has been of particular importance (Hincz, 2025).

As stated in Article 1 of this document: „This Directive promotes the improvement of the energy performance of buildings and the reduction of greenhouse gas emissions from buildings within the Union, with a view to achieving a zero-emission building stock by 2050, taking into account the outdoor climatic conditions, the local conditions, the requirements for indoor environmental quality, and cost-effectiveness." (Directive (EU) 2024/1275).

This regulation establishes requirements in areas such as: the energy performance of buildings, (…) the calculation and disclosure of the life-cycle global warming potential of buildings, solar energy in buildings. renovation passports, national building renovation plans, sustainable mobility infrastructure in and adjacent to buildings, smart buildings, energy performance certification of buildings or building units, regular inspection of heating systems, ventilation systems and air-conditioning systems in buildings, independent control systems for energy performance certificates, renovation passports, smart readiness indicators and inspection reports, the indoor environmental quality performance of buildings (Directive (EU) 2024/1275).

This directive entered into force on 29 May 2024, and Member States are required to transpose it into their national legal systems by 29 May 2026 (Hincz, 2025).

Among the solutions that various stakeholders are already incorporating into their activities in connection with the implementation of ESG strategies are long-term power purchase agreements (PPAs) for energy from renewable sources (Wysocki, 2025). In addition, energy efficiency audits and the acquisition of so-called 'White Certificates' are mentioned (Jaroszewska, Kamas, and Jach, 2025).

Another factor that can improve the energy efficiency of buildings is the introduction of digitisation solutions, including the use of modern sensors and controllers, as well as remote management solutions (Jaroszewska, Kamas, and Jach, 2025).

It has been noted that basic automated systems can save 10-15% of energy in commercial buildings and also improve user comfort (Jaroszewska, Kamas, and Jach, 2025).

For over a decade now, multi-criteria certification has been used in various segments of the real estate market. Based on research conducted by CBRE, it can be concluded that 40% of tenants declare that they are willing to pay more for space in buildings with multi-criteria certificates, while investors, due to the implementation of ESG objectives and the pursuit of 'greening' their portfolios, are even more restrictive, e.g. 47.1% declare that they would consider a higher price if the property has a green certificate, and 14.1% are not willing to invest in buildings without certification (A. Jarzębowska, CBRE as cited in Franke, Kuczera 2024).

2.2 Multi-Criteria Certification of Buildings in Poland

Much attention is devoted in the literature to the issue of multi-criteria certification of buildings, including commercial facilities from various sectors. Each type of building has its own specific characteristics related to the functions performed there (office, commercial, warehouse or residential). They naturally differ in terms of structural elements, materials, equipment and whether they are used by large numbers of people on a daily basis or, due to the number of people, even have the specific character of public spaces, as is the case with shopping centres.

Multi-criteria certification of sustainable buildings focuses on several key areas, such as energy efficiency, indoor environmental quality, efficient water management, waste reduction and maximisation of recycling, materials used in construction, transport and location (Kuczera, 2018) and can be carried out for both new and existing buildings (Kuczera, 2017).

In Poland, buildings from different sectors are awarded certificates from the following certification schemes: the British BREEAM, the American LEED, the German DGNB, GBS, HQE, WELL and Zielony Dom (Green House) (PLGBC 2025).

The first multi-criteria certificate in Poland (in the LEED system) was awarded in January 2010, while the first BREEAM certificate was issued in June 2010. Other certificates appeared on the Polish market a few years later – the HQE certificate in March 2015 and the DGNB certificate in September 2016 (Kuczera, 2017).

The most popular certificate in Poland, including in the retail sector, is BREEAM (Building Research Establishment Environmental Assessment Method) developed in 1990 in the United Kingdom. It can be applied in any geographical location, both for new buildings (New Construction) and those that have already been in use for at least two years (In-Use, Communities and Refurbishment & FitOut) (Jarzebowska, 2025)

The LEED (Leadership in Energy and Environmental Design) certificate was developed in the United States in 2000. It is currently used in 168 countries, including Poland, but is less popular in certain segments of the property market (Jarzebowska, 2025).

Table 1 presents basic information about the BREEAM and LEED systems in Poland, along with the number of certificates issued.

Both certification systems cover similar parameters in their analysis, including:

materials used, construction process, energy efficiency of the building, its location, waste management, user-friendliness, and landscaping. For new buildings, LEED and BREEAM certificates are awarded indefinitely. The difference concerns existing buildings – LEED is issued for five years, while BREEAM is issued for three years. (Jarzebowska, 2025)

Table 1. *BREEAM and LEED certified buildings and awarded grades (as of March 2025)*

BREEAM			
Types of certificates	**Number of certificates**	**Certificate grades**	**Share of certificates with particular grades**
New Construction	1001	Pass	2%
Refurbishment&Fit Out	15	Good	12%
In-use	982	Very good	47%
Communities	6	Excellent	35%
		Outstanding	3%
LEED			
Types of certificates	**Number of certificates**	**Certificate grades**	**Share of certificates with particular grades**
Certified	2%	Core&Shell	126
Silver	6%	New Construction	56
Gold	54%	Commercial Interiors	52
Platinum	37%	Existing Buildings & Recertification	34
		Warehouse &Distribution Center	12
		Schools	2

Source: *Elaborated based on Heller, Kuczera 2025.*

The database of certified buildings in Poland is maintained by the Polish Green Building Council (PLGBC), which is a non-governmental organisation (affiliated with over 80 such entities from other countries in the World Green Building Council) (Heller and Kuczera, 2025).

Currently (data as of March 2025), multi-criteria certificates cover 50,222,564 sqm of building space from various market segments (Heller and Kuczera 2025). To illustrate certain patterns in the popularity of certification systems for buildings in specific sectors, basic information on this subject for 2020 and 2025 is presented in Table 2.

The largest share (in 2025) of the total certified surface area will be accounted for by the logistics/industrial sector (54.2% – due to the large surface area of the facilities), followed by office facilities with a 25.5% share, and retail facilities with a 15.1% share (Heller, Kuczera 2025).

Over the years, certification within individual types of facilities has proceeded at varying rates. For a long time, the office sector led the way, then, due to the interest of many stakeholders, warehouse space began to be certified intensively. At the same time, for the same reason, the relative share of the retail sector decreased (Tables 2 and 4).

Table 2. *Selected aspects of multi-criteria certification of buildings in Poland in 03.2020 and 03.2025*

Sector	Share in the total surface area of certified buildings		Number of certified building		Type and number of certificates
	03.2025	03.2020	03.2025	03.2020	03.2025
Logistics/ Industrial	54,2%	16,7%	958	141	BREEAM 904, LEED 40, DGNB 14
Office	25,5%	61,4%	796	519	BREEAM 563, LEED 184, WELL 36, GBS 11, DGNB 2
Retail	15,1%	14,4%	239	122	BREEAM 232, LEED 7
Residential	2,6%	5,1%	363	43	BREEAM 255, Zielony Dom 96, LEED 7, HQE 5
Hotel	1,2%	1,9%	54	16	BREEAM 29, LEED 25
Communities	1,3%	-	92	-	BREEAM 92
School	0,1%	0,5%	7	4	BREEAM 3, LEED 2, GBS 2

Source: *Elaborated based on Kuczera (2020); Heller and Kuczera (2025).*

3. Research Results

3.1 The Modern Retail Space Market in Poland

Shopping centres, as one type of modern retail space, have been operating in Poland for about thirty years and occupy a leading position among them, measured, among other things, by their share (Table 3) in the total size of modern retail space. In the history of their development (at its beginning), there was a clear period when these facilities were built mainly in the largest cities, while in recent years, fairly intensive development (development activity) has been observed in smaller agglomerations (CBRE, 2025).

The shopping centre market in Poland is undergoing changes not only in terms of quantity – i.e. an increase in floor space – but also in terms of quality. These changes include, among other things, a specific evolution in the role of shopping centres in the supply chains of goods and services.

Table 3. *Basic information on modern retail space and shopping centres in Poland*

Information	**Value**
GLA In Stock of modern retail space (in Q3 2025)	15,5 million sqm GLA
Retail space density (Q2 2025)	372 sqm GLA per 1,000 inhibitants
Retail space density in cities with shopping centres (Q2 2025)	704 sqm GLA per 1,000 inhibitants

Share of shopping centres in modern retail space resources by format (Q2 2025)	77% shopping centers 21% reatail parks 2% outlet centers
Shopping centres by location (Q2 2025)	-8 largest agglomerations (54%) -cities 200,000-400,000 inh. (12%) -cities 100,000-200,000 inh. (14%) -cities under 100,000 inh. (20%)
Share of shopping centres by size of space (Q2 2025)	5000 – 19 999 sqm GLA (24%) 20 000 – 39 999 sqm GLA (37%) 40 000 – 59 999 sqm GLA (23%) >60 000 sqm GLA (16%)
Rental fee (Q2 2025)	-100-130 EUR/sqm/month in Warsaw -40-60 EUR/sqm/month in prime locations in other cities

Source: *Elaborated based on Brzeszkiewicz-Kuczyńska et al. 2025; CBRE 2025; Okoń 2025.*

The basic function of these facilities as brick-and-mortar retail outlets remains, of course, the main one. However, shopping centres are also making their mark in e-commerce supply chains, including in the click&collect model. The omnichannel strategy continues to be implemented by numerous shopping centre tenants (CBRE 2025), who undoubtedly want to provide customers with the opportunity to integrate sales channels into their shopping behaviour.

The evolution of the role of shopping centres is also confirmed by data on year-on-year changes in turnover in shopping centres within individual categories of goods and services sales. In this context, we can mention growth in: services (+6.8%), the health and beauty segment (+5.1%), restaurants and cafés (+5.1%) and entertainment +4.6% (in the first half of the year) (Brzeszkiewicz-Kuczyńska *et al.* 2025).

Shopping centres are facilities with high footfall. In Poland, on average, one facility is visited by approximately 400,000 people per month, while the largest ones, i.e. those with a leasable area of over 120,000 sq m and more than 250 tenants, are visited by an average of approximately 900,000 people per month. Such a concentration and flow of people requires intensive operation of ventilation, air conditioning and heating systems (Niemira-Jurek, 2025) and is associated with increased energy consumption.

In Poland, stakeholders in the shopping centre market are showing growing interest in ESG issues. Banks and financial institutions, among others, are increasingly expecting compliance with the EU taxonomy. It is considered advisable to have realistic decarbonisation strategies in place. This, in turn, poses a challenge, especially for owners of older commercial properties (CBRE 2025). Initiatives aimed at obtaining multi-criteria certificates have played an important role in this area for many years.

3.2 Multi-Criteria Certification of Retail Facilities in Poland

Based on an analysis of annual reports published by the Polish Green Building Council for the last decade (2016–2025), certain patterns can be identified regarding certification in the modern retail space market in Poland (Table 4). In 2025, the share of certified retail space in the total certified space in the country (50,222,564 sqm) was 15.1%, or 7,573,900 sq m (Heller and Kuczera 2025).

Over the years, there has been a noticeable decline in the share of certified retail space in the total certified space in the country. While in 2017 it amounted to 36%, in 2020 – 26.8%, and in 2025 – only 15.1% (Table 4).

This trend was largely due to a significant increase in interest in certification in other sectors, mainly warehousing, where buildings have very large floorspaces, which means that they are rapidly increasing their share of certified space.

The analysis should focus on the fact that in recent years (since 2021), the share of certified retail space in the total modern retail space has remained quite high, at over 50%. In 2025, 239 retail facilities were certified, which is a high number considering that in 2016 there were only 46 facilities, and in 2019 their number was 103 (Table 4). This testifies to the dynamic certification process that has been implemented over the last dozen or so years.

According to real estate consulting and brokerage specialists, it should be added that shopping centres and outlet centres are more often certified on the Polish market than retail parks (CBRE 2022).

Additionally, with regard to the size of retail facilities, it should be noted that a high percentage of buildings with multi-criteria certificates are large shopping centres – currently, this is nearly half of all shopping centres with a minimum area of 40,000 sq m GLA. Such facilities are found in Poland in cities with a population of over 200,000 (CBRE 2022).

To gain a complete picture of the issue in question, it should be noted that there is no clear correlation between the certification of a given facility and the year of its construction – its age. It should be emphasised here that both recently completed shopping centres and those commissioned in the second half of the 1990s have valid certificates (CBRE 2022).

When considering the types of certificates, it should be noted that, as in other segments of the real estate market, the BREEAM system clearly dominates. In 2025 (as of March), commercial properties in Poland held 232 BREEAM certificates and 7 LEED certificates, covering 7,570,270 sq m and 3,630 sq m of retail space, respectively (Heller and Kuczera, 2025). The decline in the percentage share of certified commercial facilities in the total area of these facilities from 59% to 50% (between 2023 and 2024), as shown in the table, is due, according to experts, to formal issues related to the expiry of some certificates (Franke and Kuczera, 2024).

***Table 4**. Characteristics of the development of certified modern retail space in Poland*

	03.2016	**03.2017**	**03.2018**	**03.2019**	**03.2020**	**03.2021**	**03.2022**	**03.2023**	**03.2024**	**03.2025**
Share of certified retail space in total certified space	no data available	36% in 10162180 m^2	33,2% in 11804850m^2	32,1% in 13871550m^2	26,8% in 17081696m^2	27,2% in 23045504m^2	23,2% in 28635704m^2	20,4% in 36409004m^2	17,5% in 38578524m^2	15,1% in 50222564m^2
Number of certified reatail buildings/share in number of all certified buildings	46 (no data available)	86 (21%)	87 (17,3%)	103 (15,9%)	122 (14,4%)	167 (15%)	171 (12,6%)	200 (12,2%)	201 (9,6%)	239 (9,5%)
Share of certified retail space in total reatail space	no data available	no data available	33% 3900000m^2 in 11700000m^2	37% 4452500m^2 in 12120000m^2	38% 4585800m^2 in 12130981m^2	51% 6222100m^2 in 12192588m^2	54% 6634500m^2 in 12281722m^2	59% 7 425100m^2 in 12600000m^2	50% 6752900m^2 in 13380000m^2	51% 7573900m^2 in 14959800m^2
Number of retail facilities by certification schemes	BREEAM 44 LEED 2	BREEAM 84 LEED 2	BREEAM 82 LEED 3 DGNB 2	BREEAM 97 LEED 3 DGNB 3	BREEAM 116 LEED 4 DGNB 2	BREEAM 160 LEED 5 DGNB 2	BREEAM 163 LEED 6 DGNB 2	BREEAM 191 LEED 7 DGNB 2	BREEAM 193 LEED 7 DGNB 1	BREEAM 232 LEED 7
Annual increase in number of certified retail buildings	In years (2010-2014) 14 (2015-2016) 12	28	31	16	19	45	4	29	1	38

***Source:** Elaborated based on: Kuczera 2016 – 2022; Franke, Kuczera 2023 – 2024; Heller, Kuczera 2025.*

It should also be noted that despite the small scale of LEED certification in the country, there have been some important developments, such as the Platinum ratings for Malta House and City 2 in City Forum (Heller and Kuczera, 2025).

4. Conclusions

The greening of supply chains is currently being implemented with consideration given to various areas of their operation. It is a multidimensional process of striving for greater environmental friendliness of these multi-entity structures, whose operation is also related to the use of various types of buildings and facilities.

Such measures are also implemented in relation to retail facilities located in the last mile, i.e. places that are important for contact with end customers. Multi-criteria certification of buildings is currently an important solution in this area. Such initiatives are also being implemented on the Polish market for modern retail space.

The results of the study indicate that the market for modern retail space in Poland is growing steadily and currently stands at over 15 million square metres. Various stakeholders are involved in environmental initiatives, including multi-criteria certification of buildings. These solutions are introduced voluntarily or result from applicable legal regulations.

Multi-criteria certification of retail properties has been carried out in Poland for over ten years, and the share of certified facilities has exceeded 50% for several years, with BREEAM being the dominant Certification system. Among the various retail formats, the Certification of shopping centres and outlet centres, the larger ones with a gross leasable area of over 40,000 sqm, dominates (Table 4).

Considering the number of factors stimulating this process, it is to be expected that more shopping centres will undergo multi-criteria certification in the near future.

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