The Baltic Valuation Conference
33. Konferencja BVC

New Attributes Resulting from the Building Management System and Smart Building Affecting the Market Value of a Construction Investment

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AGENDA

1. Introduction
2. Typical types of real estate attributes
3. New and innovative real estate attributes
   - 3A. Building Management System
   - 3B. Smart Building
4. Methods and techniques of estimating the weights of real estate market attributes
5. A mixed approach to real estate valuation with new characteristics in line with trends in the construction sector in Poland and Europe
6. Summary

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Items that I am conducting
Real Estate Appraisal; Construction Law; Organization of Construction Production; Construction Project Management; Securing the Structures at Mining Damage; Construction Works Technology; Concrete Technology; Foundation; Special foundations; Ground mechanics; Geotechnics and Foundations; General Construction II; Securing Buildings in Mining Areas; Foundations;

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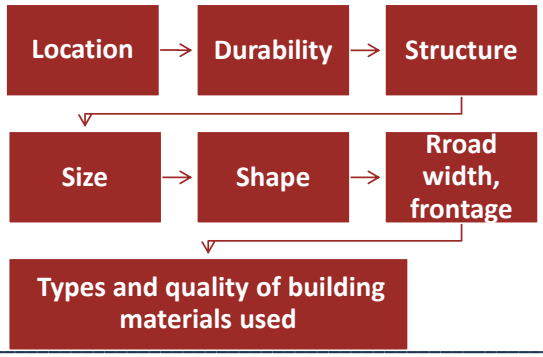
Typical types of real estate attributes

*** Location of a building plays an important role in deciding the value of a building. The buildings located in areas with proper municipal water supply, sewer and electricity have increased values. A building located on a freehold land generates a higher valuation amount compared to a building located on the leasehold land.**

*** Valuation of a building depends on the height of the plinth, height of the building, thickness of its walls, nature of structure, type of flooring, roofing, doors and windows etc.**

The valuation of building depends on various factors such as its :



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Different types of variables for analyzing selected groups of real estate attributes

INTRINSIC FEATURES: Construction Characteristics

Typology of the building	Building construction characteristics	Building installations
Apartment	Floor area	Construction year
Apartment in a Villa	no. of bathrooms	Building Automation
Attic	no. of rooms	Central Heating
Farmhouse	Floor	Photovoltaic System
Loft	no. of internal floors	Mechanical Ventilation
Multi-family villa	Common garden	Air Conditioning
Multi-storey single-family home	Private Garden	Optical Fiber
Penthouse	Private Garden Area	Lift
Single-family home	Private Garage	Solar Panels
Terraced house	Private Garage Area	Heat Pump
Two-family villa	Common Parking Space	Energy Class
	Basement	
	Basement area	
	Terrace	
	Terrace Area	
	Top Floor	
	Fireplace	
	Maintenance level	

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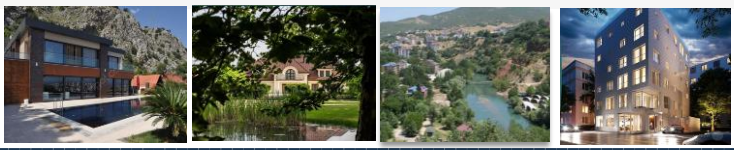
Different types of variables for analyzing selected groups of real estate attributes

Class Element or Function
Intrinsic
Typology of the building
Building construction characteristics
Building installations
Extrinsic
City centre proximity
Transports accessibility
Health services proximity
Urban amenities and leisure
Commercial areas
Education facilities proximity

POI	Point of Interest
N	Number of observations

EXTRINSIC FEATURES: Localization and Accessibility		
	Variable	**Unit**
position	Latitude of the building (observation)	coordinate
	Longitude of the building (observation)	coordinate
distance	Straight line distance from POI	Km
	Actual travel distance from POI by car	Km
time	Travel time from POI by car	min
	Travel time from POI on foot	min
	Travel time from POI by public transports	min
proximity	N. of POI in the Ped shed (400 m)	n.
	N. of POI in a 1 Km ring buffer	n.



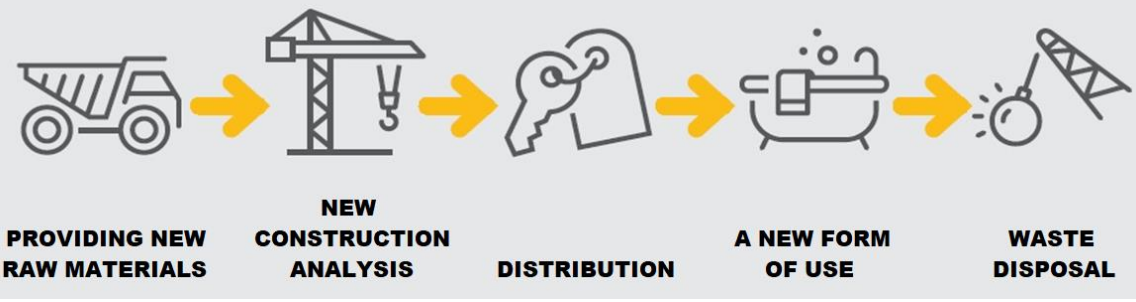
New and innovative real estate attributes

New trends in the 21st century construction sector, i.e.

- GoGreen - all about renewable energy sources, e.g. green construction;
- NoWaste - all about sustainable construction, i.e. innovative recycled building materials;
- InTech - all about new ones;
- Besmart - all about intelligent solutions in buildings, i.e. themed **Building Management System** and **Smart Building**.

This is all promoted and implemented with legal and substantive, for example, Circular Economy in Civil Engineering strategies.

New projects, building materials, technologies and construction solutions generate new buildings characteristics and new attributes affecting their reproductive and market value

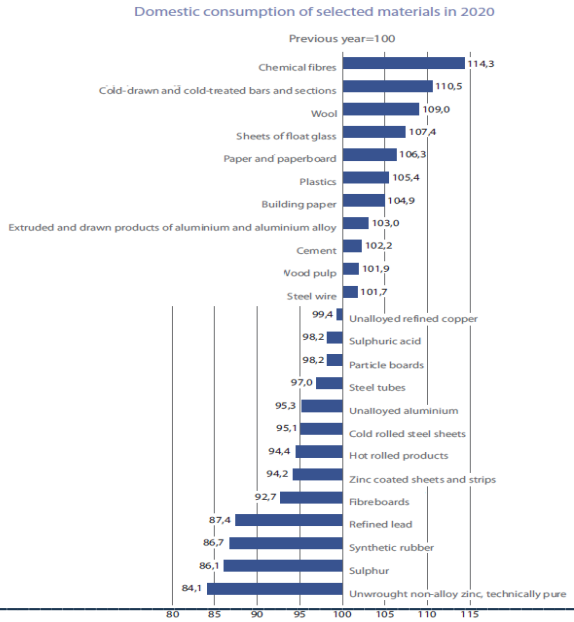


CEM Circular Economy Model for the construction industry

* aspect of new recycled building materials
* aspects of new construction investment management
* aspects of new legal and methodological foundations
* economic aspects
* environmental and social aspects

Building materials tested in Poland that are suitable for the recycling process:

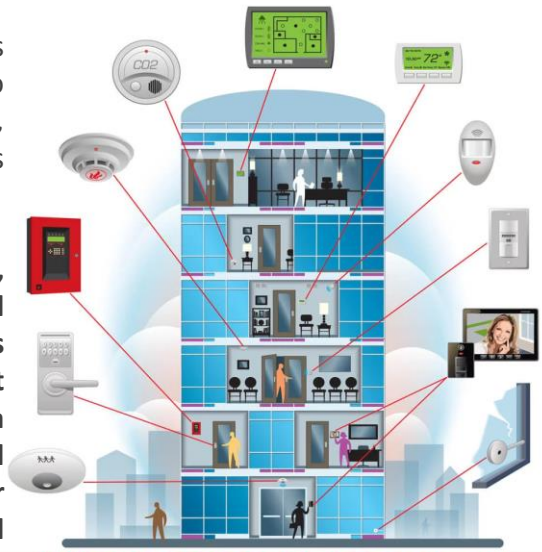
- Concrete
- Plastics
- Glass
- Metals
- Wood
- Brick and Blocks
- Gypsum
- Aggregates
- Plasterboard
- Floor and Wall Coverings
- Insulation
- Paper and Cardboard
- Land from earthworks for a given construction investment



Building Management System

- A **building management system (BMS)** is a control system that can be used to monitor and manage the mechanical, electrical and electromechanical services in a facility.

Such services can include power, heating, ventilation, air-conditioning, physical access control, pumping stations, elevators and lights. Characteristics of an intelligent building include sensors that collect data such as temperature, noise level and humidity in order to adapt heating, air conditioning, ventilation and lighting in real time.



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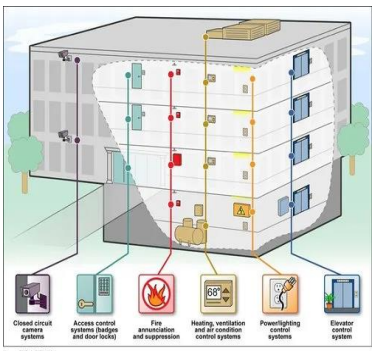
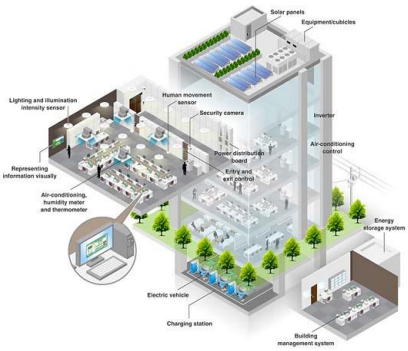
Building Management System

* BMS creates new standards and characteristics of buildings.
* It creates new guidelines in the manner and standard of building use.
* It enters new technologies and innovative methods of adapting buildings to current trends in the construction sector.
* In addition, it affects the cost of monthly fees for use and ongoing repairs, which is visible in individual CVs when valuing buildings using the income method.





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Building Management System

BMS core functionality keeps building climate within a specified range, provides light to rooms based on an occupancy schedule (in the absence of overt switches to the contrary), monitors performance and device failures in all system, and provides malfunction alarms to building maintenance cost compared to a non-controlled building. The commercial, institutional, andindustrial buildings built in the 21st century include a BMS.

New attributes of buildings with BMS affect the standard and safety of the building. They also have an increasing impact on the monthly costs of using the building in the assumed standard.



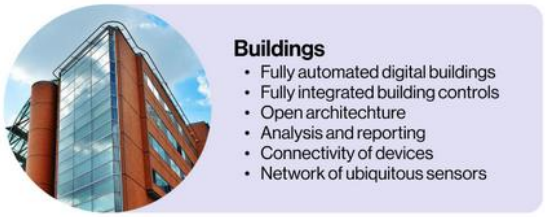

How to calculate the impact of these new attributes on the market value of real estate, on the market where transactions with such attributes are very few?

Smart Building

A **Smart Buildings** is one that uses technology to enable efficient and economical use of resources, while creating a safe and comfortable environment for occupants.

Smart buildings may use a wide range of existing technologies and are designed or retrofitted in a way that allows for the integration of future technological developments.

Internet of Things (IoT) sensors, building management systems, artificial intelligence (AI), and augmented reality are amongst some of the mechanisms and robotics that may be used in a smart building to control and optimize its performance.



Smart Building

A number of factors are driving the increased adoption of smart building solutions. These include:

Rising energy costs — many small and large businesses are looking to mitigate rising energy costs as budgets continue to feel the strain of rate hikes and supply disruption. Building owners must find ways to use energy more efficiently to manage costs.

Changing occupancy levels — the uptake of remote and hybrid working means that commercial building occupancy levels can vary from day to day. Managers are leveraging smart technology with building security in buildings to minimize the use of resources in spaces when they are not occupied.

Demand for healthy building environments — occupants of commercial buildings and multi-unit residential properties expect a safe, healthy environment. Property managers must ensure factors such as air quality or temperatures are maintained at an optimum level.

Cities
- Interconnectivity between buildings and communities
- Smart service, delivery
- IP networks and broadband
- Interconnected smart metering

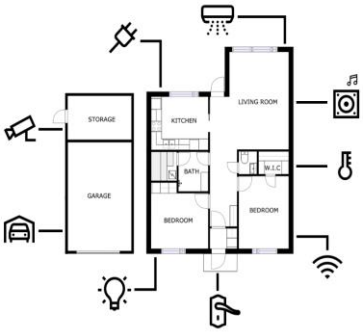
Utilities
- Optimized use of capacity
- Smart metering
- Energy price signals
- Energy storage
- Sensing and measurement

Smart Building

Extreme weather conditions — the weather can be unpredictable, no matter where building is located. Buildings that leverage intelligent building technology to adapt the internal environment to changing temperatures or extreme weather conditions can use energy more efficiently.

Availability of smart building products — smart building systems feature a number of different products and technologies, which are now widely available. Recent advancements in artificial intelligence also make it easier to analyze building sensor data, allowing building technology systems to provide a faster and more accurate response to specific events or triggers.

Open systems — a smart infrastructure integrates a large number of intelligent building components. As manufacturers increasingly adopt open standards, this makes it easier for smart building designers to integrate components for a seamless solution that can be managed on a single dashboard.



Real Estate is an ever growing industry which always has to adapt to the new technologies entering the market. It is the case when building, selling or renting a house for example.

People will always search for the latest technologies when searching for their dream home. The one in which they will feel the most comfortable, safe and good in. To match the growing expectations of customers, the real estate industry has to adapt and use the new technologies available.

New things that are important for the value of real estate:

1. Metaverse
2. NFT (Non-fungible token)
3. Desktop appraisal
4. Building Information Modeling (BIM)
5. Building Management System (BMS)
6. 5G
7. Smart homes
8. Artificial intelligence (AI)
9. Internet of things (IoT)
10. Virtual and augmented reality
11. Innovative floor plan scanning apps
12. Crowdfunding

Their weight and impact force change over time and depending on the type of real estate market

Methods and techniques of estimating the weights of real estate market attributes

Table 1. Approaches, methods and techniques for real property valuation, for valuation of a real property in mining damage areas

Approach	Method	Method
1. Comparative	1.1. Pair comparisons	–
	1.2. Average price adjustment	–
	1.3. Statistical market analysis	–
2. Profit-based	2.1. Investment	2.1.1. Simple capitalization 2.1.2. Discounted cash
	2.2. Profit	2.2.1. Simple capitalization 2.2.2. Discounted cash flow
3. Mixed	3.1. Residual	–
	3.2. Liquidation costs	3.2.1. Detailed 3.2.2. Merged elements 3.2.3. Index method
	3.3. Land estimate indicators (ground indicators)	–
4. Cost-based	4.1. Replacement cost	4.1.1. Detailed 4.1.2. Merged elements 4.1.3. Index method
	4.2. Substitution cost	4.2.1. Detailed 4.2.2. Merged elements 4.2.3. Index method

Gwóźdź-Lasoń, M. (2021). Interdisciplinary risk analysis of construction investment and property value in the areas with mining impact. *Acta Sci. Pol. Architectura*, 20 (4), 55–67, doi: 10.22630/ASPA.2021.20.4.34

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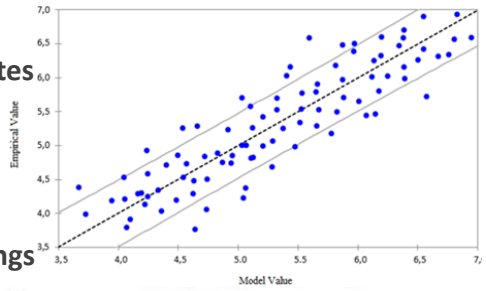
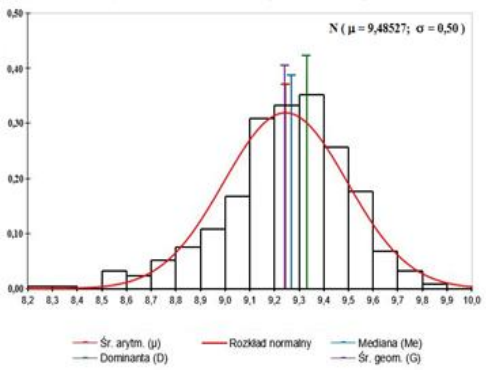
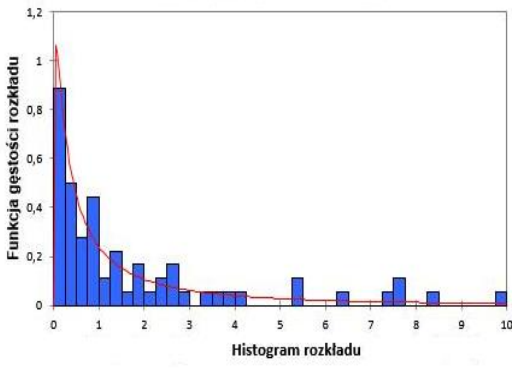
The approach accepted on the current legal grounds, to calculate the impact of new attributes of buildings on their market value, is the residual method in a mixed approach, on the basis of which you can conduct an backward method analysis and calculated the sought weight of new buildings





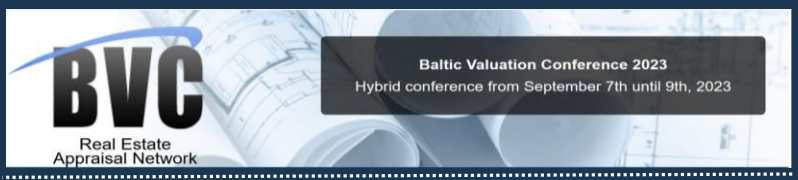


Conclusion

- New trends and technologies in the civil engineering sectors create new characteristics of newly built or modrnizoish buildings.
- New standards are created that generate new attributes of buildings.
- The standard of use of a building with: solar panels, intelligent lighting, insulation, heating, cooling, ventilation, monitoring, protection system, … creates new usage standards.
- Building materials from the new environmentally friendly technology are created by new groups of real estate, which may have in the future tax profiles, e.g. taxes due to environmental friendliness.
- The costs of implementing new often innovative projects and construction solutions are generated by additional investment costs and increases the reproductive value of the building. But additional costs invested are created by buildings in accordance with actual European and world trends and entwine to a new standard of buildings, and also reduce operating costs and give a new level of security.

Conclusion

- The new attributes of buildings do not yet have the opportunity to easily estimate the impact on market value, but everyone already knows that such an impact is a fact.
- For buildings created in investment projects of construction, renovation or moderation, but according to new trends, a traditional valuation approach to calculating new weights of market attributes cannot be estimated.
- The basic problem is the lack of a comparative database for relevant representative computing groups.
- The approach accepted on the current legal grounds, to calculate the impact of new attributes of buildings on their market value, is the residual method in a mixed approach, on the basis of which you can conduct an backward method analysis and calculated the sought weight of new buildings



THANK YOU VERY MUCH
FOR YOUR ATTENTION!

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