

Taxonomy of commercial real estate - Structuring the substantive submarket of commercially used real estate in Germany for the purpose of market observation and valuation

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SUMMARY

In an optimal market, all relevant information about a property is accessible to all stakeholders. The more transparent the market is, the better sustainable, ecologically and economically sensible market behavior and comprehensible pricing will develop. Better political and economic decisions can be made. The crucial basis for real estate market monitoring is a common understanding of what types of real estate there are and how to delineate and meaningfully aggregate them.

In Germany, there are currently inconsistent and incomplete classifications of commercial real estate. The present work closes a gap here and comprehensively covers the particular need for definition. A taxonomy was developed with which the commercial real estate types can be uniformly defined and hierarchically classified without overlap nationwide. As a result, the taxonomy differentiates between nine commercial real estate segments, including mixed-use properties.

Real estate market analyses even at the specific property type level benefit from a greater comparability, the quality and verifiability of the published data are improved (e.g. floor space data for office sales). This is of great importance not only for the industries of real estate and banking, but also for political decision-makers and state financial supervisory authorities.

By *taxonomy* we mean a uniform model (classification scheme) that categorizes objects according to certain criteria. *Commercial real estate* (“*Wirtschaftsimmobilien*”) is understood to be accessible buildings employed by the user for the creation of a product or service as a factor of production. Users of such commercial real estate are companies in the broadest sense or the public sector. It should be noted, however, that the taxonomy focuses solely on the substantive (or product) submarket. It does not address the residential, spatial, buyers', agricultural, forestry and fishing submarkets.

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The property type was operationalized under the premise of functional use at the time of sale (determining the segment, e.g. office). If more than one use is present at the same time, the area ratio is used to delineate the dominant segment. The hierarchical breakdown into non-overlapping sub-segments was another model rule. The number and, if necessary, further subdivision of the sub-segments are based primarily on the results of iterative expert discussions with representatives of various institutions. Additionally checking was made for completeness and consistency with significant national and European classifications. As a conclusion, the comprehensively reconciled taxonomy contributes to more market transparency in the real estate market in Germany in line with current requirements.

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1. BACKGROUND AND BENEFITS OF AN IMPROVED MARKET TRANSPARENCY

1.1 Background: Gaps in real estate market research

The financial and economic crisis from 2007 to 2009, the Corona pandemic or the war in Ukraine show that sudden and unpredictable price developments in real estate markets have a significant impact on the financial stability of countries. Already in 2013, the International Monetary Fund (IMF), the International Financial Stability Board (FSB), as well as the finance ministers of the G-20 and their central banks, identified the lack of Commercial Property Price Indices (CPPI) as one of the 20 gaps that needed to be addressed in order to make better statements on financial stability. Like the European Systemic Risk Board (ESRB) before it, the recommendation was made to form and monitor CPPIs in individual countries. (see European System Criteria Committee, 2007). A paper published by the European Statistical Office (Eurostat) in 2017 concludes that there is no uniform categorization of commercial real estate either in Europe or worldwide (European Union, 2017).

Clearly, these indices need to be harmonized as much as possible to guarantee sufficiently accurate price monitoring of submarkets that is comparable across country and national borders. The basic prerequisite for this is that there must be agreement on the definition of the various types of real estate. In the case of residential real estate, this distinction is relatively simple. When classifying predominantly commercial real estate, the types of real estate are much more diverse and difficult to aggregate. Above all, there are a variety of criteria for classification in different industries and also regions.

1.2 Real estate, its definitions and its classification perspectives

The definition of the different types of real estate often depends on the perspective and objective of the analyses. In the literature, the concept of real estate is defined, among others, as follows: *“Real estate is an asset consisting of undeveloped or developed land with associated buildings and outdoor facilities. They are used by people within physical, technical, legal and temporal boundaries for production, trading, service or consumption purposes.”* (Bone-Winkel et al., 2005: 3-25.).

For the determination of real estate values, the usability of the property is of particular importance. *The fair value/market value of a property is largely determined by the purpose for which the property is held or acquired* (see Kleiber, 2023). The intended use therefore determines the value of the property. In this taxonomy, therefore, it is primarily the use existing at the time of sale that determines the property type.

In addition, there is an unanimous view that multifamily properties that serve the owner to generate profits should not be defined as commercial real estate, but as residential properties. The background to this is, among other things, that the provision of the population with adequate housing is part of the state's provision of public services and is regulated by law to a large extent.

1.3 The importance of real estate market transparency

Transparency in the broadest sense is at the core of democratic action. This applies in particular to political action and here especially to the right to equal treatment under Article 3 of the German Basic Law (Grundgesetz). In an optimal market, all relevant information about a property is accessible to all stakeholders. The more transparent the market is, the better sustainable, ecologically and economically sensible market behavior and comprehensible pricing will develop. Better political and economic decisions can be made.

Since around 2010, the German real estate market has been characterized by price increases, some of them very sharp, especially in the residential segment. At the current edge, market experts now see a trend reversal triggered by sharp increases in construction and energy costs, supply chain problems, a turnaround in interest rates on the financial markets, the ongoing labor shortage in the construction industry, and also as a result of the Russian war of aggression on Ukraine. Uncertainty about further market developments is high among industry experts, and at the time of finalizing this report the forecasts of various institutes and official bodies diverge in some cases significantly. Especially because of the political and social explosiveness of the events on the real estate market, a stronger networking of the analysis results of expert committees, research institutes and other actors is of growing importance and demanded.

Transaction data on the sale of real estate are registered by expert committees (anchored by law in the Building Code, §§ 192 ff.). Analyses of these data show around one million real estate sales annually (share deals not included). Transaction databases from banking associations or larger brokerage houses also exist. Due to a lack of legal regulations, no official rent statistics exist in Germany. This problem makes it virtually impossible to create genuine transparency on the tenant market. With a very high proportion of rented apartments of over 50 percent, there is clearly a need to catch up here and in various other fields.

The Real Estate Valuation Ordinance (ImmoWertV) in Germany, which has been in force since January, 2022, is a step forward toward greater transparency. This and other associated federal guidelines aim to make real estate valuation more comparable throughout Germany and to replace the non-binding, highly location-specific guidelines for official valuation.

To improve the quality of the analyses and to meet the requirements of a transparent real estate market in a timely manner, information from different data sources must be combined (in compliance with data protection laws). This requires that the market data be valid, verifiable and comparable. The crucial basis for this monitoring is a common understanding of what types of real estate there are and how to delineate and meaningfully aggregate them.

1.4 Formation of an expert group

The increased attention of banking supervision since 2006 to improve transparency on the real estate market provided the fundamental impetus for initiating regular expert discussions. The core questions were primarily how and on the basis of which identifiers commercial properties are to be classified. In addition, the question arose as to how this approach can be made as consistent as possible across sectors and regions. Until now, inconsistent and incomplete classifications of commercial real estate have existed side by side, often sector-specific according to the requirements of the respective industry, and not adapted for decades.

The regular professional exchange with real estate experts in Germany from a wide variety of backgrounds since 2013 has highlighted the fundamental need for a clear definition of property types. Overall, the expert discussions revealed a considerable need for coordination for data matching between, for example, transaction databases and supply databases of different players. A total of around 12 external experts for the respective property types were involved in the regular expert group discussions and their securing of results. Additional input was provided by the members of the various ZIA committees, so that the results developed in a revolving process. The technical discussions were chaired by Dr. Michael Hellwig (ZIA), with Peter Ache (AK OGA), Sabine Georgi (ULI), Dr. Michael Hellwig (ZIA) and Eva Katharina Neubrand (BBSR) taking the technical lead.

2. STRUCTURING THE TAXONOMY MODEL

2.1 Formation of hierarchical levels and categories

2.1.1 First Level: Spatial and substantive submarkets

When monitoring the market in the real estate sector, the basic indicators include, for example, transaction figures, investment sums when purchasing real estate, sales of land, residential and usable space, and real estate prices. An analysis of these basic data should be possible for different **substantive submarkets** (property types), for longitudinal analyses over time, and also in consideration of different **spatial submarkets** (regional market environments). A taxonomy already starts with the distinction between the spatial, substantive and purchaser submarkets (= top level of the hierarchy). These have to be separated from each other, as mixtures can complicate data analysis, e.g. if spatial and substantive criteria are not recorded separately from the outset (e.g. "downtown hotel") and cannot be disentangled in retrospect. It should be noted, however, that the spatial submarkets arise as a function of the

substantive submarkets and cannot be transferred on a one-to-one basis. Residential real estate, for example, has different spatial references and spatial distinguishing features than retail real estate. The taxonomy initially focuses on the substantive submarkets.

2.1.2 Further Levels and the distinction residential vs. commercial properties

The hierarchical order of the substantive submarkets can be read as follows:

- groups (e.g. developed land),
- categories (e.g. commercial real estate),
- segments (e.g. retail properties) and
- sub-segments (e.g., large-scale retail properties).

Below the hierarchical level of the sub-segments, further types of real estate, some of which are listed as examples, can be named for a more concrete description (e.g., retail warehouses).

At the second level, a distinction is made between developed and undeveloped land (= groups), which corresponds to the most common procedure. The group of undeveloped land has not been considered further for the time being. Therefore, in this report, the term "real estate"/"property" is always used to refer to developed land.

At the third level, three categories are formed: commercial real estate, residential properties and agricultural/forestry and fishery properties. The respective category is relevant if the corresponding share (referring to gross income, or alternatively to residential or usable floor area) of the type of use predominates, i.e. exceeds 50 percent.

Within the third level, the term *residential properties* is the most unambiguous, as it targets the basic function of housing and thus implies a specific use (see European Banking Directive, European Union, 2013). In the case of commercial real estate, the use as a production factor is more diverse, e.g., as sales space, storage space, or office space. The category of residential properties has not been dealt with in principle in this report, but very clear demarcation criteria have been defined for commercial real estate that also includes a residential function, as opposed to purely residential properties (see section 3.6 healthcare and social properties).

The German term "*Wirtschaftsimmobilie*" (commercial real estate), which was newly created by the authors, describes real estate that serves commercial purposes in the broadest sense. This technical term is more comprehensive and now also semantically includes combined modern leisure, shopping or accommodation properties, e. g..

The taxonomy is based on the following definition of commercial real estate, which has now also been adopted by the German federal government:

Commercial real estate is such (walk-in) buildings that the user utilizes as a factor of production to create a product or service. Users of commercial real estate are companies in the broadest sense (e.g. also associations) or the public sector.

Although it must be concluded from this definition that real estate serving agricultural, forestry or fishing purposes is to be classified as commercial real estate, these types of real estate are categorized separately (see top level). This decision is based on the one hand on a completely different use of the land, and on the other hand takes into account the views of official valuation and statistics.

2.2 Segments of commercial real estate

The category of developed commercial real estate includes properties with very heterogeneous uses and return on investment targets. The individual segments and sub-segments are described and classified in more detail below according to their property types and uses (see also Fig. 1).

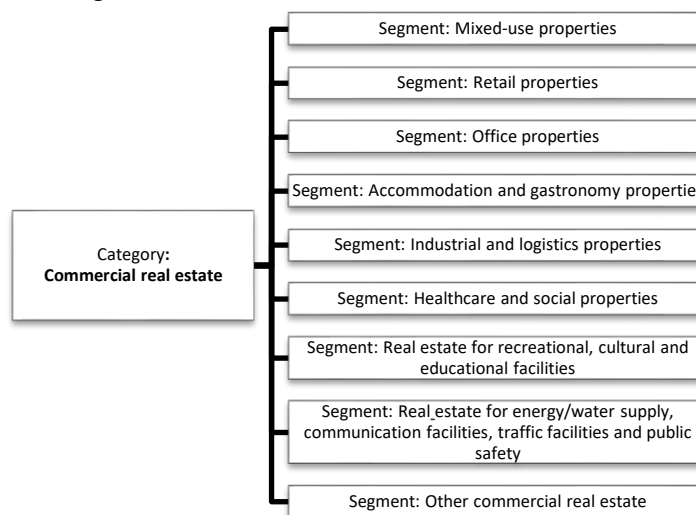


Fig. 1: Segments of the commercial real estate category

3. TAXONOMY OF COMMERCIAL REAL ESTATE

3.1 Segment: Mixed-use properties

Mixed-use properties are in line with the general trend toward a more diverse and mixed-use urban environment. In this special segment, different types of use and areas of life are combined in one property in order to increase the respective quality of use through synergy effects.

The basic rules to classify mixed-use properties and to distinguish all other segments from it, are:

- At least two different, independent uses (defined by one of the segments) are located.
- In a pure mixed-use property segment, none of the uses accounts for more than 50 percent of the total use (see Figure 2).
- A use ratio of more than 75 percent is defined as dominant, so that this property is classified in the appropriate segment (e.g., as office property segment with more than 75 percent office use).

- In the case of use shares between 50 and 75 percent, the property is classified in the corresponding sub-segment and given the prefix "mixed-use" (e.g., 60 percent retail use would indicate a mixed-use retail property). This ensures that properties that actually have a clear core use generally remain distinguishable.
- In principle, the percentage should refer to the gross profit of the property. However, in practice, the floor area ratio is regularly used as an alternative.

There is a growing importance of "mixed-use quarters" (or "neighborhoods") as a new real estate asset class for investors, traded as a whole in a transaction. Currently, there is a definition proposal by gif (2022) for this property class that has not yet been finalized and names the following classification elements as essential: there are at least two different main uses (each max. 75 percent of the total area), a social use value is mandatorily integrated (e.g., a daycare center), and a publicly accessible space connects several buildings. So far, this new real estate class has not yet found its way into the taxonomy, but this is conceivable for the future.

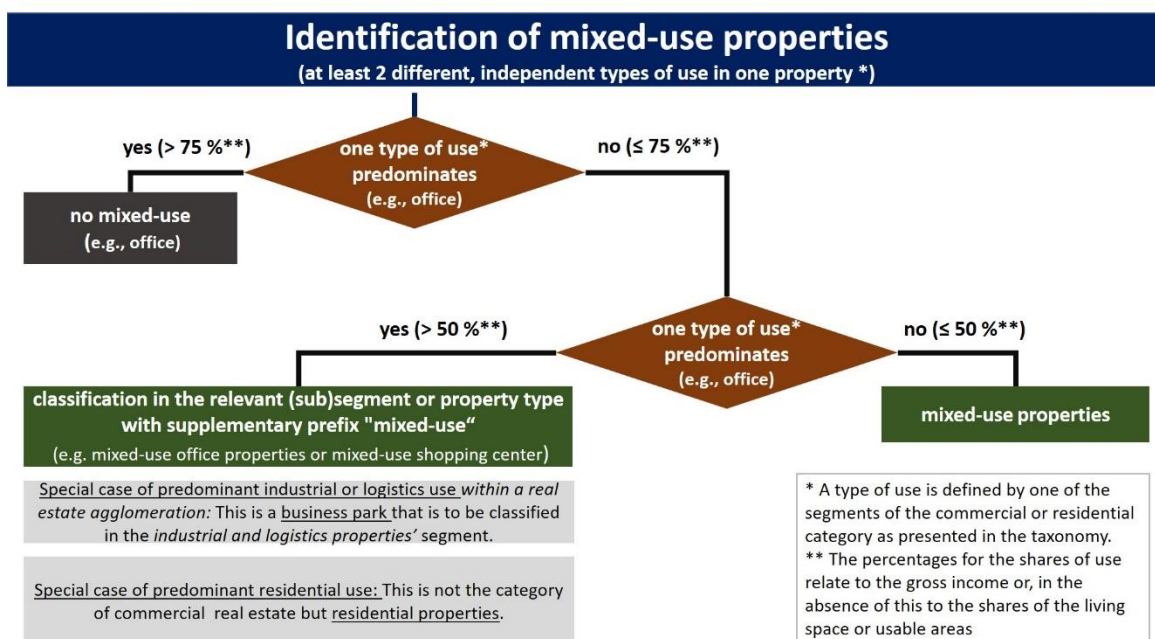


Fig. 2: Identification of mixed-use properties

3.2 Segment: Retail properties

Retail properties are used for at least 50 percent retail purposes. Up to 50 percent of the property may therefore be dedicated to typically complementary types of use (here: such as offices, cafés or restaurants, but also logistics). If there are several independent types of use and the proportion of retail use is between 50 and 75 percent, the property is referred to as a mixed-use retail property; the prefix "mixed-use" is then added to the respective sub-segment or the corresponding property type (see also Fig. 2).

The categorization of sub-segments of retail properties was based on retail formats or types of distribution in combination with typological features such as area sizes and functional criteria of construction. In summary, the following sub-segments were defined:

- large-scale retail properties ($\geq 800 \text{ m}^2$ sales area)
- small-scale retail properties ($< 800 \text{ m}^2$ sales area)
- high-street retail properties
- wholesale properties
- other retail properties

Real estate type	Sales area in 1,000 m ²	common ratios/ conversion factors ^[1]	Assortment	Number of tenants	Floors	Agglomeration
Shopping centers	> 10	VK/NUF ^[2] approx. 80 % NUF/BGF ^[3] approx. 65-70 %	Focus on SMCG ^[4] , integrated service offerings (such as catering).	several; usually small-scale tenant mix	(as a rule) multi-storey	possible, always with joint management
Retail warehouse parks	usually > 5	VK/NUF approx. 85 % NUF/BGF approx. 85 %	Focus SMCG	several, usually large-scale tenant occupation	mostly ground level	possible, usually with joint management
Retail warehouses	(unlimited)	VK/NUF approx. 90 % NUF/BGF approx. 90 %	Focus on one product group	1	mostly ground level	possible, but with independent operation
Department stores (german: <i>Warenhaus</i>)	10 to 30	VK/NUF approx. 75 % NUF/BGF approx. 75 %	Focus on SMCG (deep & broad), integrated service offerings	1	multistorey	no
Department stores (german: <i>Kaufhaus</i>)	1 to 10	VK/NUF approx. 75 % NUF/BGF approx. 75 %	SMCG (deeply structured from one material group)	1	multistorey	no
Hypermarkets	5 to 15	VK/NUF approx. 75 % NUF/BGF approx. 90 %	Focus on FMCG with a focus on experience orientation	1	mostly ground level	no
Grocery retail properties:						
- Discount grocery store	usually < 1	VK/NUF approx. 75 % NUF/BGF approx. 90 %	Food	1	mostly ground level	possible, but with independent operation
- Supermarkets	0,8 to 1.5	VK/NUF approx. 75 % NUF/BGF approx. 90 %	Food	1	mostly ground level	possible, but with independent operation
- Consumer markets	1.5 to 5	VK/NUF approx. 75 % NUF/BGF approx. 90 %	Food	1	mostly ground level	possible, but with independent operation
- Local supply centers	usually < 5	VK/NUF approx. 75 % NUF/BGF approx. 90 %	FMCG with a focus on local supply	several	mostly ground level	yes, joint management possible

[1] Reading aid based on hypermarkets: $10,000 \text{ m}^2 \text{ VK} / 0.75 \approx 13,333 \text{ m}^2 \text{ NUF} / 0.9 \approx 14,815 \text{ m}^2 \text{ GFA}$.

[2] VK: Sales area, NUF: Usable area (DIN 277-1); Source: HypZert study "Valuation of retail properties (as of October 2019).

[3] NUF: usable floor area, GFA: gross floor area (DIN 277-1); Source: HypZert study "Valuation of retail properties (as of October 2019).

[4] Slow moving consumer goods (SMCG) are defined in contrast to fast moving consumer goods (FMCG: food, but also detergents, cleaning agents, personal care products).

Tab. 1: Differentiation guide for property types in the sub-segment "large-scale retail" (missing here: market and exhibition halls)

Within the sub-segment of *large-scale retail properties*, the distinction is usually and primarily made on the basis of sales area. In addition, the assortment of goods also represents a useful criteria (see Tab. 1).

High-street retail properties are mixed-use, but share above 75 percent retail use; usually supplemented by at least one other type of use such as residential, office, gastronomy (if the retail share is between 50 and 75 percent, the prefix is added to "*mixed-use high-street retail properties*").

3.3 Segment: Office properties

Office properties are generally found in central business districts of cities and metropolitan areas and are geared in their functionality to office work and related services; this also includes administrative buildings and town halls as well as co-working spaces. The office

segment comprises all properties at least 50 percent of which are used as offices. Up to 50 percent may be used for complementary purposes (such as cafés or restaurants, but also retail). For further information on the definition of mixed-use office properties, see Fig. 2 and the explanations of the definition methodology under 3.2.

Office properties can be classified in the following sub-segments, based on their leasable area for commercial space (MFG; see gif, 2017):

- Small office properties (up to 1,000 m² MFG): usually no investment objects
- Medium-sized office properties (1,000 to 10,000 m² MFG): partially investment-grade
- Large office properties (over 10,000 m² MFG): typical investment objects

The aim of this categorization by leasable area is to obtain more differentiated property rates and thus less distorted market values. For this purpose, it is necessary to distinguish between, for example, offices of freelancers, classic multi-storey office buildings and high-rise office buildings as independently as possible of investment qualities and market phases.

3.4 Segment: Accommodation and gastronomy properties

To date, there have been a large number of different approaches to categorize the accommodation and gastronomy property segment. The authors classify the following sub-segments, according to their primary use:

- Hotel properties:
 - Budget Hotel, tourist category (1-2*)
 - Economy Hotel, standard category (2-3 *)
 - Middle-Class Hotel, comfort category (3-4 *)
 - First-Class Hotel, higher comfort category (4-5 *)
 - Luxury Hotel, very high comfort category (5* and more)
- Real estate for other accommodation facilities:
 - Pension, inn or guesthouse
 - Youth hotel or hostel
 - Serviced apartments / boardinghouse
 - Holiday resorts
 - Other accommodation properties
- Gastronomy properties

Up to 50 percent of the accommodation and gastronomy property segment may therefore be dedicated to typically complementary types of use (such as retail or offices, but also residential; see Fig. 2 and the explanations of the definition methodology of mixed-use under 3.2).

Hotel properties are used for the temporary accommodation of persons (lodging), which generally also includes catering and other services, such as the holding of conferences, wellness facilities or similar. The categorization of hotel properties is based primarily on the hotel's amenities, location and other services offered, and thus on the different user groups of the respective hotel categories.

The amenities of a hotel property are most likely to be reflected in the German Hotel Classification of the German Hotel and Restaurant Association (see DEHOGA, 2023). In addition, categories can be added to the classic star classification (see HypZert, 2023). It should also be taken into account that large hotel chains have now created their own quality standards (e.g. "Motel One", "Steigenberger" etc.).

Gastronomy properties provide food services related to day guests. The range extends from smaller snack bars and fast-food chains up to star-rated restaurants. A distinction is made between independent gastronomy properties (exclusively types of operation in the traditional gastronomy industry) and mixed-use gastronomy properties. When it comes to "system gastronomy", one often also speaks of a "freestander" if the object was newly built especially for this purpose and in standardized construction. System gastronomy is partly franchising and achieves higher profitability.

3.5 Segment: Industrial and logistics properties

The industrial and logistics properties' segment comprises all real estate used for manufacturing and production purposes. This includes the manufacturing areas themselves, as well as real estate or usage areas for upstream or downstream processes, such as storage, distribution, administration or research and development. The properties do not necessarily have to be located in spatial contexts. Logistics properties also include properties used for the distribution of goods (see ZIA, 2023).

Industrial and logistics properties are at least 50 percent used for such purposes. Up to 50 percent of the property can therefore include typical complementary uses (such as offices or restaurants; see Fig. 2 and the explanations on the definition methodology of mixed-use in section 3.2).

The sub-segments of industrial and logistics properties are:

- Real estate with manufacturing space
 - Generic manufacturing space (light industrial)
 - Specialized production areas (heavy industrial)

The distinction between "light industrial" vs. "heavy industrial" is based on two criteria: the third-party usability of the production areas and the ratio of construction costs and costs of production facilities in relation to the total investment costs of the property.

- Business parks
- Real estate for industrial research and development
- Warehouse and logistics properties (see Table 2)
- Other industrial and logistics properties

In the meantime, the range of tasks and services offered by *warehouse and logistics properties* has expanded significantly beyond pure warehousing. Today, for example, comprehensive repair work, extensive returns management or, in some cases, individual production steps of

the manufacturing value chain are also implemented in the logistics property in the sense of Industry 4.0.

Real estate type	Task	Hall height in m (UKB) [1]	Useful area in 1,000 m ²	Floor bearing load in t per m ²	Gate per 1,000 m ² hall area [2]
Distribution Real Estate	Goods distribution (storage, handling, picking, distribution and transport)	≤ 15 (predominantly 10 - 12)	≤ 60 (predominantly 15 - 30)	≤ 10 (predominantly 4 - 5)	≤ 10 (predominantly 5 - 6)
Fulfillmentcenter	E-commerce goods distribution (storage, handling, picking, distribution and transport)	≤ 18 (predominantly 10 - 12)	≤ 175 (predominantly 30 - 75)	≤ 9 (predominantly 4 - 5)	≤ 4 (predominantly 1 - 2)
Handling Real Estate	Goods handling	≤ 12 (predominantly 8 - 10)	≤ 50 (predominantly 5 - 10)	≤ 7 (predominantly 4 - 5)	≤ 20 (predominantly 7 - 10)
Warehouse properties	Storage of goods close to production	≤ 16 (predominantly 7 - 10)	≤ 12 (predominantly 3 - 9)	≤ 8 (predominantly 5 - 6)	≤ 3 (predominantly 1 - 2)
Cold storage	Storage and shipping of goods at low temperature	≤ 25 (predominantly 8 - 12)	≤ 65 (predominantly 5 - 15)	≤ 9 (predominantly 4 - 5)	≤ 12 (predominantly 1 - 4)
Special logistics real estate [3]					
- Deep freeze warehouse	Storage and shipping of goods at very low temperatures	≤ 25 (predominantly 10 - 20)	≤ 30 (predominantly 6 - 15)	≤ 9 (predominantly 4 - 5)	≤ 3 (predominantly 2 - 3)
- High bay warehouse	Storage of goods by means of high shelves	≤ 40 (predominantly 20 - 36)	≤ 20 (predominantly 3 - 10)	≤ 10 (predominantly 7 - 8)	≤ 3 (predominantly 1 - 2)

[1] The height of the lower edge of the truss (UKB) is an indication of the useful height of a hall. It refers to the distance from the hall floor to the roof truss.

[2] VK: In addition to the various gates for trucks and vans, there is always at least one gate with ground-level access, which can often also be used for operational purposes.

In the case of smaller facilities, this may be only one, and in the case of larger facilities, one per 10,000 m² of hall space.

[3] Also includes dangerous goods stores.

Tab. 2: Differentiation guide for property types in the sub-segment “Warehouse and logistics properties”

Real estate for industrial research and development primarily serves the upstream and downstream areas of industry and production. This includes laboratory real estate in particular. A special case is a real estate agglomeration with centralized management, in which industrial, production or logistics use predominates. This is classified as a *business park* (without the prefix "mixed-use").

3.6 Segment: Healthcare and social properties

Healthcare and social properties cover a broad spectrum of uses, which are primarily of a caring, custodial, charitable, medical, healing and/or nursing nature. Characteristic of social and health care properties is usually that the users of the facilities accept a temporary or permanent restriction or complete cessation of their own independent household management.

Health care and social properties have at least 50 percent health care or social use. Up to 50 percent of the property therefore includes typical complementary uses (such as residential or offices; see Fig. 2 and the explanations on the definition methodology of mixed-use in section 3.2).

These are the sub-segments and further levels of health care facilities or real estate types of healthcare and social properties:

- Outpatient healthcare properties
- (Partial) inpatient healthcare properties
- Operator-oriented social properties:
 - Care homes (mostly aimed at senior citizens)
 - Outpatient assisted living communities (different forms of living together, often supplemented by an affiliated day care center)
 - In-/outpatient composite concepts (integrated mixed form of outpatient and inpatient care services)

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- Assisted living properties for non-elderly reasons (enable people with disabilities or children to live there for psychosocial reasons)
- Assisted living properties for age-related reasons (living arrangements for seniors with limited independent housekeeping, usually due to medical handicap)
- Service living for seniors (the need for care is not at the focus here; depending on the scope of services, categories up to five stars are distinguished)
- Other healthcare and social properties

Outpatient healthcare properties are used primarily for medical purposes and provide outpatient care. This includes services provided by physicians (medical practices, medical centers, etc.) or medical counseling services (e.g., physical or occupational therapists, psychosocial services, midwives, pharmacies, optometrists, medical supply stores, etc.).

(Partially) inpatient healthcare properties are predominantly properties used by physicians. An important criterion is the availability of beds for possible at least partial inpatient care, so that day or night clinics (mostly for geriatrics and psychiatry/psychotherapy) and practice clinics are also classified here. Specifically, this sub-segment includes all buildings of hospitals, university, rehabilitation and spa clinics, which may also be operator-oriented.

A variety of terms have emerged in the real estate market for social properties (e.g., senior living, assisted living, senior residences), most of which are not clearly defined without overlap. Often, the focus of the level of care or, conversely, the independence of the user is not entirely clear. Also, the focus of use "residential properties" vs. "commercial real estate" is not clearly separated. It is important to clarify that *operator-oriented social properties* are always commercial real estate. In contrast, in the case of senior-friendly, low barrier housing without further care and service offerings, the residential purpose is in the foreground, which is why such properties are to be counted as residential properties. Unless an operator or agency manages the facility. In this case, the operator organizes the care services and bears the economic risk, which is decisive for the financing side and which "displaces" the residential purpose.

The following principles are to be taken into account to differentiate *operator-oriented social properties*:

- The real estate is managed as a whole by a single organization.
- Typically, the entire property is leased to the sponsor or operator by an investor.
- The apartments are leased centrally to the residents by the operator.
- The services are modular and residents are cared for according to graduated degrees.
- Community and therapy rooms are available on the grounds.

3.7 Segment: Real estate for recreational, cultural and educational facilities

Real estate of this type is distinguished from social and health care real estate, for example, by its focus on uses that, in the broadest sense, serve the education and physical/mental development of the population and/or meet the need for gathering in communities during

leisure time. In addition to sports facilities, cultural and church buildings, this category also includes schools as well as daycare centers. The latter certainly also have a providing or custodial character and are not only subject to educational demands. Nevertheless, it is more plausible to group them together with schools in this segment.

In the expert discussions, the following sub-segments were considered to be particularly relevant, although the structure has yet to be defined and revised:

- Educational institutions and non-industrial research
- Day care facilities for young children and preschoolers
- Facilities for specific social groups such as youth facilities
- Non-commercial facilities for the cultivation of community life
- Sports facilities
- Commercial leisure properties (clubhouses, cinemas, discos, nightclubs, arcades, theme parks, etc.)
- Cultural buildings
- Institutions for the cultivation of religious traditions and communities
- Other real estate for recreational, cultural and educational facilities

3.8 Segment: Real estate for energy/water supply, communication facilities, traffic facilities and public safety

The real estate in this segment comprises buildings and other structures that are firmly connected to the ground and primarily serve the following uses (only exemplary and not yet conclusively determined). Often, the purpose of yield is subordinate to the purpose of supplying and securing the population.

- Real estate for energy/water supply and for waste disposal
- Real estate for transport facilities
- Real estate for communication facilities
 - Data centers
- Real estate for public safety

Data centers are technical buildings for the central operation of information technology and network telecommunication systems, which mainly includes data storage, processing and transport services. Commercial data centers are becoming more relevant and are increasingly establishing as an asset class in their own right.

3.9 Segment: Other commercial real estate

This segment includes all commercial real estate that cannot be allocated to the above-mentioned and already defined real estate segments.

4. CONCLUSIONS AND OUTLOOK

The present report fills a gap with regard to inconsistent and incomplete classifications of commercial real estate in Germany. The taxonomy developed comprehensively covers the particular need for definition of commercial real estate types. The most important types of real estate, which strongly dominate the market, have thus been defined clearly, without overlaps and in agreement with a large number of institutions and disciplines. Additionally checking was made for completeness and consistency with significant national and European classifications. Real estate market analyses also at the level of individual property types benefit from greater comparability, and the quality and verifiability of the published data are improved.

The argumentation and terminology developed within this framework have met with a broad response: The first version of the 2016 results report was cited as exemplary by Eurostat, (Eurostat, 2017) and the technical term "*Wirtschaftsimmobilie*" (commercial real estate) has found its way into the industry and is also increasingly used by the German government. The official purchase price collections of the state expert committees are gradually being converted to the categories of the taxonomy.

In the course of the project, the weaknesses of the official data collection became very clear, especially in the field of commercial real estate (e.g. missing information on economic returns of real estate, building descriptive characteristics such as equipment etc. or classifications of spatial location quality). Further project work will therefore increasingly address the question of how the matching of real estate-relevant analysis data from different institutions can be made practicable. Further next work steps will focus on the definition of the buyer submarket and likewise the category of residential real estate. Furthermore, the definitions made in this taxonomy of commercial real estate are also subject to constant review and further development.

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