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OBSOLESCENCE OF THE BUILDING CONTRIBUTIONS TO FUNDAMENTALS OBSOLESCENCE

BY

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Abstract. Buildings as goods that best express the quality of life (compared to other categories of goods), are defined by their quality requirements.

Quality requirements associated with construction have both temporal and spatial characteristics. The temporal characteristics result from the quality requirements that express the current level of human knowledge and technology in a specific period of time. Spatial characteristics result from the fact that quality requirements associated with construction express social and economic status of the country as whole.

Buildings as material goods are designed to satisfy the most important human needs (which express the quality of human life), and they achieve this goal through the way they are used. From the functional perspective, buildings are subject to a complex process of wear, namely, normal physical wear, accidental wear, and obsolescence.

Normal physical wear and accidental wear are based on methodology definitions formulated by INCERC Romania. However, the same methodology creates a certain level of confusion, since it defines obsolescence of capital goods group 1 “construction”, without regard to the characteristics they present.

Key words: building; quality requirements; normal physical wear; accidental wear; obsolescence.

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1. Introduction

After the Second World War humanity was facing a grave economic and housing crisis. For a Europe destroyed by war the only feasible way to resolve the housing crisis was large-scale construction of housing blocks.

Technical solutions implemented at the time were based on achieving the lowest cost, thereby solving the problem in terms of quantity but not quality.

This led to subsequent high costs in the period of the buildings' use, and had a significant impact on theirs residents (as these are buildings in which people spend approx. 80% of their time), because the buildings do not possess the characteristics needed to satisfy all requirements of their inhabitants, taking into account various factors.

2. Characteristics of Construction

Construction, also referred to as real estate goods, are a form of immovable property, which cannot be moved from one place to another without losing its character or its initial purpose.

Fulfilling many essential human needs, buildings are the most important goods created by humans, fulfilling extremely important technical and economic roles.

The following characteristics of real estate goods – both technical and economic – distinguish construction greatly from any other goods, making them *unique*.

2.1. Long Service Life

One of the most important features of buildings is their long service life. This is influenced by their design, execution, and quality of materials used in the construction process.

2.2. Building Durability

Building durability means resistance of a building, resulting from sustainable construction elements under specific conditions of exploitation. Given the continued growth of destructive environmental events (natural and artificial), construction should be designed with a view to increased physical durability, in order to ensure a continued exploitation over the whole operating lifetime.

2.3. Reliability

Reliability means using design and execution in such a way, as to ensure all the qualitative elements needed to contribute to better use of the building throughout its lifetime (which according to normative acts can reach up to a hundred years).

2.4. Buildings are Immovable Property

This is because it combines a large amount of natural materials, shapes and dimensions. In general, materials constitute aprox. 60%…65% of the total cost of construction. The rest are costs of labor, mechanical means of execution, transportation and many other indirect expenses. All the above characteristics have a strong impact on the definition of obsolescence.

3. The Concept of Performance

Overall, performance is understood as the behavior of a certain product in relation to its usefulness.

The concept of performance in relation to real estate (buildings), differs from the concept of performance for movable goods. This is due to the characteristics listed above: buildings have a long service life, they offer durability and reliability; they are immovable property, and last but not least they are very expensive products.

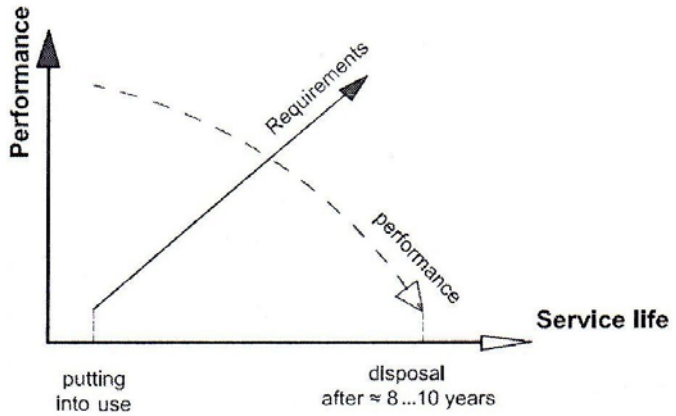

Fig. 1 – Variation of performance and requirements of movable goods, as a function of time.

By contrast, mobile goods, are disposed of after a relatively short period of time due to their very low performance.

After their effective removal from service the mobile asset is broken into its final constituent parts and materials, then may be put to a new use (recycle). Such disposal results in the replacement of the discarded good (purchase) by a more performing product that matches new requirements of the user.

3.1. The Concept of Building Performance

Construction legislation in Romania interprets the quality of construction at the highest level through the concept of performance.

This concept signifies a systemic and global approach to the issues of quality in design, implementation and exploitation of buildings, starting from the activities and needs of users, regardless of material means and solutions used, emphasizing the functional characteristics of buildings.

Quality requirements have a longer validity. Unlike these, performance requirements are those that over the life cycle of the building are subject to changes (improvements), as a natural result of increasing human demands.

Fig. 2 presents the performance of a building during its life, depending on the requirements (as part of the essential requirements of quality) to which the construction should correspond.

Over the life time of the building, changes occur on one hand in the exploitation conditions and the requirements, and on the other hand in the action of external factors, that, over time, lead to a reduced performance of the building.

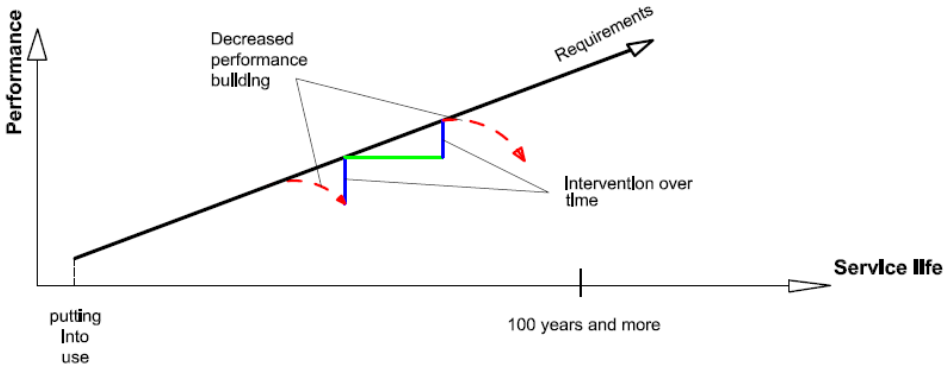

Fig. 2 – Variation of performance and requirements of the real estate goods as a function of time.

To avoid such decrease of performance of the construction over time, intervention works like modernization, rehabilitation, repairs or consolidation are required.

Such interventions aimed at maintaining the ability to use the construction throughout its lifespan (until demolition), all elements of construction must meet performance levels contained in six essential requirements set out in Law nr. *10*/1995 (as ammended).

4. Construction Wear

Every real estate good undergoes gradual depreciation of its technical properties and hence its value, as a result of economic use (amortization), and the actions exerted by natural influences. This impairment is called *construction wear*.

The three categories of wear related to construction are: normal physical wear, accidental wear, and obsolescence.

For normal physical wear and accidental wear, Romanian legislation stipulates a clear definition, and establishes practical methods of determination/evaluation.

However, obsolescence of buildings has long been ignored, lacking a clear definition and a proper evaluation method. This is because only economists were in charge of defining this type of wear, and they interpreted it in the same way as the obsolescence of other (movable) goods. Physical complexities of construction, and the complex requirements construction is subject to, result in a completely different content, and in an extremely complex manifestation of obsolescence.

For this reason it was considered that the meaning and content of the definition of obsolescence for buildings is irrelevant and unenforceable.

5. Obsolescence of Buildings

Given all of the above, we have defined obsolescence of buildings as the total of all nonconformities, expressed as a percentage of replacement of actual value, in relation to the applicable quality requirements as of the evaluation date, different from those that were part of the initial construction design.

Since construction is a set of elements, each of which has its role in determining its performance, it is considered that building obsolescence can't be analysed or researched for the construction as a whole.

Nevertheless, a logical approach to the problem of obsolescence would be to analyse this type of wear for each of the essential requirements associated with different elements of construction. Thus, given that essential requirements have evolved over the past 50…100 years, there are inconsistencies between the essential requirements that led to the initial design of the buildings, as opposed to the new requirements that occurred during the period of use.

For an easier understanding of the concept of the buildings obsolescence, we comparatively analyze the acts of the past 20 years, the evolution of "Hygiene, Human Health, Restoration and Environmental Protection" requirement.

4.2. Occurrence of Obsolescence as a Result of Quality Requirement "Hygiene, Human Health, Restoration and Environmental Protection" Evolution

The principal characteristics which most be fulfilled are concentrated in Table 1.

Table 1

Quality requirement: "Hygiene, Human Health, Restoration and Protection of the Environment"		
Performance criteria	Level of performance	
	NP 016 – 1996 repealed law	NP 057 - 2002
The concentration of polluting substances		In the form of volatile substances: max. 0.035 mg/m^3
a) Content of formaldehyde in air, derived from material		containing not more than 25 mg formaldehyde / 100 g solid
b) Carbon monoxide content		6 mg/m^3
c) Carbon dioxide content	max. 1,600 mg/m^3 in the air (approximately 0.085% volume of the room)	max. 1,600 mg/m^3 in the air (approximately 0.05% volume of the room)
d) Water vapour content		– max. 15.400 mg/m^3 (T_{med} = 25° ± 3°C) in summer time; – max 9.450 mg/m^3 (T_{med} = 20° ± 2 ° C) in winter time.
e) Radioactivity content of radon 220 and/or 222 radon from soil or materials	max. 100 Bq/m^3/year	max.140 Bq/m^3/year. Forbidden: the use of building materials containing radioactive substances
f) Dust content	max. 0.5 mg/m^3	
g) Oxygen concentration		16.3% of the room
Minimum number of exchanges of fresh air, for various types of rooms. **A**. *Natural ventilation*		
Air exchange (the whole house)	0.05…1 vol/h	0.5 … 1 vol/h

Table 1

Continuations

B. *Mechanical ventilation* (exhaust ventilation individual) Exhaust air flow		
For the kitchen without windows	45…120 m^3/h	min. 120 m^3/h
Bathroom	30…60 m^3/h	min. 60 m^3/h
Shower room, with toilet and sink		min. 60 m^3/h
		Living rooms will be provided invariably with the possibility of natural ventilation.
Technical Conditions: Lighting Artificial lighting		
For living rooms:	General lighting: 200 lx; Local lighting: Reading – 300 lx; Sewing – 500 lx.	General lighting: 50…100 lx
Bathroom	Local lighting – 200 lx; General lighting: 75 lx (on h = 0.85…1 m of the floor).	Local lighting: 100…200 lx
Kitchen	General lighting : 100 lx, (on h = 0.85…1 m of the floor); local lighting: 200 lx	Local lighting: 300 lx
Technical Conditions: Thermal Comfort Hygiene		
Ensuring normal hygrothermal ambience (temperature in summer)	23°…26°C	max. 25°C
Heating system must ensure the minimum temperature	18°C	20°C
Heating system must ensure the minimum temperature in bathroom	18°C	20°C
The amount of heat from the foot of floor, connected to the cold-hot sensation in the living room:	$Q_1 = 40 \times 10^3 \ldots 50 \times 10^3$ J/m^2; $Q_1 = 200 \times 10^3 \ldots 300 \times 10^3$ J/m^2;	$Q_1 = 40 \times 10^3 \ldots 50 \times 10^3$ J/m^2 ; $Q_1 = 40 \times 10^3 \ldots 50 \times 10^3$ J/m^2
The amount of heat from the foot of floor, connected to the cold-hot sensation in the over room	$Q_1 = 40 \times 10^3 \ldots 50 \times 10^3$ J/m^2; $Q_1 = 40 \times 10^3 \ldots 50 \times 10^3$ J/m^2;	$Q_1 = 40 \times 10^3 \ldots 50 \times 10^3$ J/m^2; $Q_1 = 40 \times 10^3 \ldots 50 \times 10^3$ J/m^2;

Performance of the new demands set out in applicable laws will determine the degree of noncompliance, and the level of nonconformity of the building elements the current quality requirements.

A further analysis of this problem would represent a remarkable beginning for the study of multiple, and complex meanings and manifestations of obsolescence.

4. Conclusions

Analysis of obsolescence makes it possible to assess the capacity of the construction for regular use, while meeting all the essential construction quality requirements.

The technological developments that are particularly emphasized (in the last 20 years) together with increased needs, have lead to a more pronounced obsolescence of buildings compared to other types of wear.

The knowledge of this aspect will induce all relevant subjects/participants involved in construction to adopt solutions that would correspond to as long a time-frame as possible.

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UZURA MORALĂ A CONSTRUCŢIILOR
Contribuţii la fundamentarea uzurii morale

(Rezumat)

Calitatea bunurilor este o problemă primordială ce îi preocupă pe oameni de foarte mult timp. Ea a fost definită ca totalitatea facilităţilor şi caracteristicilor unui produs sau serviciu care satisface nevoile stabilite sau implicite. Însă, întrucât noţiunea are o largă utilizare, este extrem de dificilă definirea ei din punct de vedere ştiinţific dar şi pragmatic.

Calitatea în construcţii a fost definită ca rezultatul tuturor performanţelor unei construcţii ce se află în exploatare, având scopul de a satisface cerinţele utilizatorilor.

Aceste cerinţe se pot diferenţia astfel: cerinţe funcţionale, fiabilitate şi durabilitate, psihosenzoriale (igienă şi confort, estetice) şi economice.

Conform acestor cerinţe calitatea nu este exprimată printr-o singură caracteristică, ci printr-un ansamblu de caracteristici care variază continuu în relaţie cu nevoile clienţilor.

Legea nr.*10*/1995 privind calitatea în construcţii stabileşte şase cerinţe de calitate pe care trebuie să le îndeplinească o construcţie. Aceste cerinţe de calitate sunt exprimări calitative a caracteristicilor clădirii: rezistenţă şi stabilitate; siguranţă în exploatare; siguranţă la foc; igienă, sănătate, refacerea şi protecţia mediului; izolaţie termică, hidrofugă şi economie de energie; protecţia împotriva zgomotului.

Aceste exigenţe, prin conţinut şi formulare determină un caracter îndelungat, însă performanţele acestor exigenţe sunt supuse modificărilor în sens pozitiv, ca rezultat firesc al creşterii cerinţelor umane.

Prin utilizare construcţiile sunt supuse unui proces complex de uzuri, şi anume: uzura fizică normală, uzura accidentală, uzura morală. Dacă pentru uzura fizică şi cea accidentală există definiţii clare şi sunt stabilite metode de determinare/evaluare, uzura morală a fost mult timp ignorată, nefiind nici bine definită, nici corect evaluată.

Transferul definiţiei uzurii morale de la bunurile mobile (rezultatul activităţilor industriale) la bunurile imobile, de tipul construcţiilor, este lipsită de orice temei tehnic şi economic, astfel încât ea nu a putut fi utilizată în domeniul practic.

Noua definiţie propusă se referă la construcţia ca bun cu conţinut complex (datorită caracteristicilor ce le fac diferite de celelalte bunuri) şi o funcţionalitate total diferită faţă de alte categorii de bunuri, considerate de asemenea mijloace fixe.

Analiza evoluţiei performanţelor esenţiale ale construcţiilor, în baza actelor normative din ultimii ani (actele normative abrogate şi cele în vigoare) permite determinarea gradului de neconformitate a elementelor unei construcţii, respectiv stabilirea uzurii morale a acestora.

Cunoaşterea acestui fapt va face posibil ca toţi cei ce participă în procesul de execuţie a construcţiilor să adopte soluţii care să corespundă unei perioade de timp cât mai îndelungate.