Analysis of factors for definition and comparison of real estate values in the District of Évora

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Abstract – The study was carried out with the available elements, of historical and current character, originated in specific legislation and market operators. It focuses on buildings located in the Municipality of Évora. A New Construction Appraisal criterion was established and derived for the Usage Appraisal function of the state of conservation and in relation to the characteristics at the time. The characterization was divided into five indicative periods of changes in the construction and technological processes. For this, the tables of "Cost Structures" of Bezelga (1984) were used. These tables have been adapted according to the season to allow their use for the defined periods.

As a result of the weighting of various factors involved in the composition of real estate prices such as land, fees, infrastructures, taxes, financial charges, projects, profit / risk and construction, New Real Estate Appreciation Tables were created with the characteristics of periods for current date, values that corrected by the coefficient of age give the current value of the properties used.

With the availability of data (1985 to 2018), two samples were constituted, totaling 1599 buildings. The adjustment of historical values corrected by the inflation rate and age to the selling values is verified. It follows that developments in real estate do not differ from developments in general consumer prices. This weighting has a regional scope, according to the proposed areas, and can be extrapolated to another region with the necessary corrections, especially in relation to the terrain values.

Keywords: Inflation; Age; Values Sale; Land; Costs; Construction.

I. Introduction

Despite the development that this area has had, real estate appraisal is still an activity with some subjectivity. The foundation of training for many real estate appraisers is heterogeneous and in several less solid areas; Therefore, there is a continuing need for development and proposals to improve methods, models and ways of working. This document aims to increase knowledge by proposing a specific assessment method appropriate to the area of study. For an informed and complete development of the valuation model it was necessary to know the global characteristics of the area in question, Évora City, and the properties belonging to it. To this end, information regarding this area was collected and processed, as well as the various existing assessment techniques. Masters dissertations, books, scientific articles, current legislation and studies related to real estate appraisal were consulted. Various information from the area under analysis was collected and organized, including bank valuations, construction companies operating in the region and real estate market values.

II. State of the art review

The real estate market needs the disclosure of quality and quantity pricing information in order to become more competitive and less speculative.

According to Shiller *et al.* (2009), housing prices caused many *"misunderstandings"*. This *"misunderstanding"* (which caused house prices to rise at a very high rate) led many people to invest in real estate. This was one of the main causes of the housing bubble, whose collapse fueled the economic crisis that began in 2008. This *''misunderstanding''* can also contribute to rising house prices when the crisis is over. Lack of building materials is no reason for house prices to rise. For example, in the United States, when the great crisis of 2008 occurred, the *Engineering Price Record* construction price index (based on labor, wood, cement and steel prices) has fallen from consumer prices over the past 30 years. To the extent that there is a world market for these factors of production, the situation should not be much different in other countries. Since land products are traded on world markets, the price of any land type should be roughly the same everywhere. From the perspective of Shiller *et al.* (2019) is a worrying fallacy that people tend to confuse price levels with the pace of price change, believing that if in one country house prices are higher, the price growth rate in that country will also be higher. The truth may be just the opposite. Higher prices in a certain country may create conditions for them to go down in the future. *'' The expectations that are raised during housing price bubbles are often quite unrealistic. House prices cannot go up over long periods of time, because then no one could buy a house ''* (Shiller *et.al,* 2009).

The work developed by different real estate professional organizations has had as its main objectives to create and implement standards rules to be universally adopted and at the same time to train qualified and certified professionals to ensure compliance with accepted procedures. However, there is still no single internationally accepted property valuation model which, by standardizing procedures, enables real estate valuation to be carried out in an effective and comparable manner across the European Union. According to Vaz (2015), since the valuation of a property is an extremely important factor for the stable financial market and for financial institutions, the use of universal methods (applied by all valuers) is required, in order to produce reliable valuations that accurately reflect the true property value. Some international institutions and organizations, such as the International Valuation Standards Committee (IVSC), TEGoVA and RICS, have created standards and guidelines for procedures considered mandatory in the production of the Real Estate Appraisal and Evaluation Report, but no standardization has yet been achieved in terms of organization, information and assumptions of the different Valuation Reports produced by different individuals, companies or entities (Godinho, 2017). Simply accepting standards is not enough, their effective implementation is the key element. For public safety and confidence in the evaluation process to be achieved, standards must not only be interpreted uniformly and consistently, but also respected and actively monitored (RICS, 2014).
Regarding the national regulations (Portugal), the main reference is Law No. 153/2015 of September 14th, which regulates the access and exercise of the activity of real estate appraisers.
According to Peto (1997), there are a reasonable number of methods and approaches for valuing assets, being the *"Comparative Market Data Method"*, the *"Reproduction Cost Method"* and the *"Income Method"* the three most common worldwide. The preponderance of the use of one method over another varies from country to country and region to country, depending on two factors: the purpose of the assessment and the availability of data that can be taken as basis for the assessment. If the market

were perfect and there were no defects that changed it, the value estimates obtained would be identical by applying any of the valuation methods. *"However, this independence between evaluation methodologies and fields of application does not prevent a specific method from adapting better or worse than another method to solve a concrete problem."* (Couto, 2007)

Comparative Method: According Nebreda, Padura e Sánchez (2006), the *"Comparative Method"* consists of the valuation of the property by comparison, according to actual transactions and / or acquisition proposals for properties with identical physical and functional characteristics, whose location is within the same area of the property real estate market.

Cost Method: According to Henriques (2002) and Santiago (2008), it applies mainly to very old buildings or in buildings or parts of them to set insurance premiums, compensation and taxation, among others. Pimenta (2011) states that *"For very specific buildings, which only matter to the end for which this method was designed, this will sometimes be the only possible evaluation technique."* This means that it is only used when there is a lack of activity in the market that makes the use of the comparative method unfeasible and when the real estate to be valued does not allow an evaluation by the yield approach (TEGoVA, 2016).

• Reproduction Cost Method

As quoted in Figueiredo (2018), *"... corresponds to the cost of carrying out an identical work, which is "a copy" of the one being evaluated."* This determination requires a detailed knowledge of the project in question, level of finishing and equipment, as well as the prices for the various works, in order to make a more or less perfect estimate of the cost of construction (reproduction).

• Replacement or Replacement Cost Method

The ''replacement cost'' is relative to the cost of performing a similar work with performance levels identical to those of the property under evaluation (or higher if the addition does not lead to an additional cost). It refers to the cost of carrying out a similar work, and its construction is unthinkable using the same construction materials and processes used at the time of its construction (Appraisers, 2005).

Income Method: In this method, the property is seen as a productive asset, capable of producing income, with a certain level of income and, therefore, income, and may be an urban building or a rustic building (GWL - Realty Advisors, 2011).

III. Building price components and building characterization

Market Transaction Values in 2018

The city under study was delimited by zones based on the Évora Urbanization Plan. Since the study is based on the real estate market analysis, adjustments were made to the areas covered by the Urbanization Plan according to the volume of transactions recorded, otherwise they would be only concentric crowns. The Table 1 shows the market values for 2018 covering the entire defined zoning.

Table 1: Market values practiced in the different areas of Évora in 2018.

Area[1]	Plot weight (%)		Land Value (€ / STP)		Construction Value (€ / STP)		K Value (€/m² STP)	
	Flat	Housing – Villa	Flat	Housing – Villa	Flat	Housing – Villa	Flat	Housing – Villa
Monumental area	35	37,5	600	720	590 (I)[2]	636	523	564
Center, first crown and avenues	31	33,3	500	600	590 (I)	636	523	564
Second crown	27,3	27,3	375	450	530	636	470	564
Third crown (standard zone)	20	20	250	300	530	636	470	564
fourth crown	20	16,7	200	240	530	636	470	564
Rural areas with infrastructure	12	14	137,5	165	530	530 (III)[3]	470	470
Rural areas without infrastructure	-	10,3	-	120	-	550 (IV)[4]	-	488 (IV)

Characterization of the building according to age

After research related to the constructive character of housing and, based on the headings of the Bezelga Cost Structure matrix (1984) and the characteristics of the current new construction, follows the characterization of the construction in Table 2 according to the diferences with evolution of materials, equipment, construction and technological processes for each heading, consistent with the time period to which it relates.

Tabela 2: Characterization of the construction for each period.

ITEM	BEFORE 1920	1920 – 1960	1960 – 1980	1980 – 2000
STRUCTURAL FOUNDATIONS	Direct.	Only in cyclopean concrete.	Insulated in reinforced concrete and cyclopic concrete.	Reinforced reinforced concrete with screed over rockfill on the ground floor.
STRUCTURE	It has no structure independent of the constituent elements of the walls and floors.	Identical from 1960 to 1980 but without lintels and without pins. The masonry is sturdy and the vaulted ceilings in clay tiles with 20x10x5 or 20x10x3.	In housing-villa and flats up to 2 floors: lintels and pillars in concrete with the masonry and voided slabs of prestressed rafters and ceramic brick, topped with 5mm diameter sun mesh; On floors above 2 floors: reinforced concrete gantry.	Reinforced concrete gantry.
ROOF	Canudo tile over wood structure.	Canudo tile over wood slatted and wood structure.	Lusa tile prestressed structure or wood.	Over prestressed concrete structure or metal structure and lusa tile covering. No direct thermal insulation on the ceiling slab.
MASONRY WORK	In mud, stone and solid brick.	In solid brick, being outside at one and a half times and inside at once.	Simple perforated brick. Exterior 30x20x22; Interior 30x20x11; Partition 30x20x22.	Exterior: Double wall bored brick 30x20x15 and 30x20x11, without thermal insulation; Interior: simple brick wall 30x20x11.

[1] Monumental zone, center and 4th crown pay low value rates. Monumental zone, center and rural zones with null rates.
[2] Subsoil cost and / or earth movement and, conditionalism of circulation (plus costs).
[3] Transportation (plus costs).
[4] Costs with basic infrastructures and transportation.

COVERING WALLS AND CEILINGS	In slaked lime mortar and whitewash.	They are predominantly hydraulic lime.	Identical from 1980 to 2000.	The stucco is not synthetic and was applied manually at the beginning of the period.
FLOOR COVERING	Screed or wood on wood slats.	Humid areas: hydraulic mosaic; Dry areas: pine.	Identical from 1980 to 2000.	Humid areas: mosaic; Dry areas: wood (non-laminate floor).
EXTERIOR SPANS	Exterior openings and wooden shutters.	Lacquered wood with wood doors and simple glass.	Wood and aluminum (aluminum only at the end of the period);	Simple glass without thermal break. Lacquered wood and anodized aluminum at the beginning of the period.
INTERIOR SPANS	Just the opening or wood.	Either there is no protection or they are in lacquered solid wood.	Hollow scoreboard doors and platex, with varnish or enamel finish.	Varnished or lacquered wood.
KITCHEN EQUIPMENT	N.A.	N.A.	Walls and wooden frame or nonexistent. It has no accessories.	Doors in varnished solid wood, masonry boxes in the lower with wooden frames. Without accessories.
MOSAICS AND CERAMIC TILES	N.A.	In humid areas.	In humid areas.	In humid areas with height between 1.60 and 2.00m.
ELECTRICAL EQUIPMENT	N.A.	Visible one point of light and one power outlet per partition; or does not have.	Per partition has one point of light and one power outlet.	One point of light per division; five power outlets in the kitchen; one power outlet in the bathroom; two power outlets per room; two powers outlets in the living room.
TELECOMMUNICATION EQUIPMENT	N.A.	N.A.	One telephone in the hall, one telephone in the living room.	TV only in living room and master bedroom.
BATHROOM EQUIPMENT	N.A.	Simple, no bathtub and only with cold water; or does not have.	T0 to T3: one unit; T4 to T5: One unit plus an additional area (RGEU); Simple taps; Bathtub or base in enamelled iron or enamelled cast iron.	White sanitary ware and simple taps; White acrylic bathtub or shower tray (T0, T1, T2 with one unit; T3, T4 with two units (one main and one secondary); T5 with three units (two main and one secondary)); Fans for air renewal.

IV. Formulation of the evaluation model

The appreciation of the property with current construction characteristics was achieved due to the characterization of the new construction (housing building, annexes and public places) and the appreciation of property in the "standard zone" for land value (V_L), construction value (V_C) and value of K (V_K). The assumption for the calculation model in equation 4.1 is the appraisal value will be equal to the sale value (V_S).

$$\text{Appraisal Value} = \text{Sale Value } (V_S) = V_L + V_C + V_K \quad (4.1)$$

The model results from the detailed quantification of the charges with each operation:

- **Land Value (V_L):** By averaging all the values obtained according to the study done in terms of legislation the land value for the standard zone represents 20.69% of the sale value (V_S). By treating the sample the value of the land represents 20% of the sale value (V_S).

- **Construction Value (V_C):** This component will cover the costs of the building, whether the main building, the annex, walls, patio and its exterior arrangements. Using the actual construction tasks, with detailed description and quantification of the nominal and percentage cost, articulated with the Cost Structure tables used for evaluation, the aim is to reach the construction cost value of 2018 per square meter of STP. With knowledge of cost values and construction processes it was possible to estimate values**.** It will be adopted as a base the housing villa of one floor, which will be extrapolated to other types. For the area of study in this document, Bezelga tables are applied and used by construction companies in the Region.

- **K Value (V_K):** This component includes all costs not directly related to the transformation of the land from rustic to urban, as well as those not directly related to the dry construction costs of the building. The sum of all the parcels totals 37,6%.

1) Registrations and cancellations = $1\%V_S$
   Acquisition of land; mortgage, and bank financing; building registration; cancellation for sale of the previous charges (data of the Code of registration and notary)
2) Financial charges = $6{,}5\%V_S$ (average total use during 1/4 of the period for a rate of 4% per year) for a period of 72 months)
3) Projects = $4\%V_S$ (Land subdivision operation; Edification)
4) Licensing and surveys = $1\%V_S$
5) Real estate commission, promotion and advertising = $4\%V_S$
6) Estimated annual net profit of 1% per year for 6,5 years = $6{,}5\%V_S$
7) Direct taxes =$14{,}6\%V_S$ (transaction tax, stamp, VAT, corporate income tax, municipality taxes)

Valuation of variables for the used real estate

The calculation model for the properties used will be the same as the new model, assuming that the used value will be equal to a percentage of the new construction value. The predominant variable in relation to the new property is the value of the construction Thus we can consider as main variables to quantify and to value to derive for the evaluation of used the following:

1. Variation of construction characteristics in each period;
2. Age (old age coefficient by Municipal Property Tax Code (CIMI));
3. Conservation state;
4. Correction of the K value of the property used to restore to the state of new property (V_W).

V. Replacement value to new state

A correlation was established between the cost of a building executed today if it had the current characteristics at the time for each period under analysis. This correlation was performed in relation to the 1 floor housing villa table (M_1) by Bezelga (1984), and the results for the remaining typologies were extrapolated. The Table 3 shows these relation between the construction values ($V_{\text{New Construction}}$).

Table 3: Construction values for each period as a function of the value of the new construction.

CONSTRUCTION PERIOD	CONSTRUCTION VALUE
2000 – 2018	$100\%V_{\text{New Construction}}$
1980 – 2000	$95{,}0\%V_{\text{New Construction}}$
1960 – 1980	$79{,}7\%V_{\text{New Construction}}$
1920 – 1960	$70{,}3\%V_{\text{New Construction}}$
BEFORE 1920	$55{,}75\%V_{\text{New Construction}}$

It will be assumed that the K value of the used property (V_W) will be equal to the difference between the K value of the new property (V_K) and others costs ($V_{K'}$). Thus, with the exception of the transaction tax (already settled in the used one), all other calculation factors remain and are directly related to a variation of the value of the "type construction'' for the period with the value of the new construction, this variation will be ''Δ''.

$$V_W = V_K - V_{K'} \tag{5.2}$$

$$V_{K'} = (V_K - \text{transaction tax}) \text{ x } V_{\text{Sales}} = (37{,}6\% - 1{,}3\%) \text{ x } \Delta V_{\text{Sales}} = 36{,}3\%\Delta V_{\text{Sales}} \tag{5.3}$$

$$\Delta = V_{\text{New Construction}} - V_{\text{Period Construction}} \tag{5.4}$$

Table 4 summarizes for each period the results obtained from equations 5.2, 5.3 and 5.4.

Table 4: Values for the used property.

PERIOD	V_K	$V_{\text{New Construction}}$	$V_{\text{Period Construction}}$	Δ/100	$V_{K'}$	V_W
2000-2018	$0{,}376V_V$	100%	100%	0	0	$0{,}376V_V$
1980-2000	$0{,}376V_V$	100%	95%	0,05	$1{,}82\%V_V$	$0{,}358V_V$
1960-1980	$0{,}376V_V$	100%	79,7%	0,203	$7{,}37\%V_V$	$0{,}302V_V$
1920-1960	$0{,}376V_V$	100%	70,3%	0,297	$10{,}78\%V_V$	$0{,}268V_V$
BEFORE 1920	$0{,}376V_V$	100%	55,75%	0,4425	$16{,}06\%V_V$	$0{,}215V_V$

Calculation of K value correction in used real estate

As in the previous point, demolition costs were not recorded. Considering that the K value (V_K) in the period 2000 to 2018 (referred to as new construction) does not change, using a simple three rule, taking this reference period with a value of 100%, the values in Table 5.

Table 5: Value of K for the property used.

PERIOD	K VALUE OF THE USED PROPERTY (V_W)	CORRECTED K VALUE FOR NEW CONSTRUCTION
2000 – 2018	$0{,}376V_S$	V_K
1980 – 2000	$0{,}358V_V$	$0{,}95V_K$
1960 – 1980	$0{,}302V_V$	$0{,}803V_K$
1920 – 1960	$0{,}268V_V$	$0{,}713V_K$
BEFORE 1920	$0{,}215V_V$	$0{,}572V_K$

Values for current construction with characteristics of the periods analyzed

By applying the equations of Table 4 and Table 5 and using Table 1, the values for the current housing construction with the characteristics of the studied periods will be indicated in Table 6, Table 7, Table 8 and Table 9.

Table 6: Property values between 1980 and 2000.

Area	Value of sale, with correction of K due to the market (€)		Land value (€)		Construction value (€) 0.95Vc		Value of K (€) 0,95Vk	
	Flat	Housing – Villa	Flat	Housing – Villa	Flat	Housing – Villa	Flat	Housing – Villa
Monumental area	1660	1860	600	720	560	605	500	535
Center, first crown and avenues	1560	1740	500	600	560	605	500	535
Second crown	1325	1590	375	450	505	605	445	535
Third crown (standard zone)	1200	1440	250	300	505	605	445	535
Fourth crown	1150	1380	200	240	505	605	445	535
Rural areas with infrastructure	1087,5	1115	137,5	165	505	505	445	445
Rural areas without infrastructure	-	1077	-	120	-	505	-	465

Table 7: Property values between 1960 and 1980.

Area	Value of sale, with correction of K due to the market (€)		Land value (€)		Construction Value (€) 0,797Vc		Value of K (€) 0,803Vk	
	Flat	Housing – Villa	Flat	Housing – Villa	Flat	Housing – Villa	Flat	Housing – Villa
Monumental area	1490	1680	600	720	470	507	420	453
Center, first crown and avenues	1390	1560	500	600	470	507	420	453
Second crown	1174	1410	375	450	422	507	377	453
Third crown (standard zone)	1049	1260	250	300	422	507	377	453
Fourth crown	999	1200	200	240	422	507	377	453
Rural areas with infrastructure	936,5	964	137,5	165	422	422	377	377
Rural areas without infrastructure	-	950	-	120	-	438	-	392

Table 8: Property values between 1920 and 1960.

Area	Value of sale, with correction of K due to the market (€)		Land value (€)		Construction Value (€) 0,703Vc		Value of K (€) 0,713Vk	
	Flat	Housing – Villa	Flat	Housing – Villa	Flat	Housing – Villa	Flat	Housing – Villa
Monumental area	1388	1569	600	720	415	447	373	402
Center, first crown and avenues	1288	1449	500	600	415	447	373	402
Second crown	1083	1299	375	450	373	447	335	402
Third crown (standard zone)	958	1149	250	300	373	447	335	402
Fourth crown	908	1089	200	240	373	447	335	402
Rural areas with infrastructure	845,5	873	137,5	165	373	373	335	335
Rural areas without infrastructure	-	855	-	120	-	387	-	348

Table 9: Property values before 1920.

Area	Value of sale, with correction of K due to the market (€)		Land value (€)		Construction Value (€) 0,5575Vc		Value of K (€) 0,572Vk	
	Flat	Housing – Villa	Flat	Housing – Villa	Flat	Housing – Villa	Flat	Housing – Villa
Monumental area	1228	1398	600	720	329	355	299	323
Center, first crown and avenues	1128	1278	500	600	329	355	299	323
Second crown	939	1128	375	450	295	355	269	323
Third crown (standard zone)	814	978	250	300	295	355	269	323
Fourth crown	764	918	200	240	295	355	269	323
Rural areas with infrastructure	701,5	729	137,5	165	295	295	269	269
Rural areas without infrastructure	-	706	-	120	-	307	-	279

For reach the values of property used at the current date (if it is admitted that at the time of its construction were with the current characteristics considered for the period) and which are in a normal state of conservation in relation to age, the construction value and K value will be affected by the property tax code coefficient of age.

VI. Identification of the factors of valorization and devaluation in relation to the current characteristics and their quantification

It was necessary to quantify devaluation factors and valuation of these characteristics, which concluded that the value of the land and its surroundings may affect the valuation value between -10% to +7.7% and the value of construction from -8.1% to +22.9% depending on the location and specific building.

VII. Conclusions

The adequacy of historical values (a fact not generally accepted and a generator of real estate bubbles) corrected by the average consumer price inflation rate to the current market values is verified. It can be deduced from this that the evolution of Real Estate in long period analysis follows the evolution of general consumer prices and that speculation only affects the value for short periods (supply / demand market).

With the proposed zoning it is expected that this will constitute a valid element for the evaluation of buildings in the future. The clear definition of the different factors involved in the price of real estate, especially in relation to the K value will correspond to an important element, often neglected in the overall assessment despite its weight in total over 30%.

In the Study carried out, it was tried to mark temporal periods in which the constructive and technological processes had alterations susceptible of affecting with some meaning the value of the evaluation of the real estate. Bezelga's (1984) Cost Structures were adapted as a function of the variation of the most significant constructive processes to allow the use of similar Tables for the different time periods defined. As a result, new real estate valuation tables have been created with the typical characteristics of the various time periods for the current date, values multiplied by the Property Tax Code (CIMI) coefficient of age give a current satisfactory value of real estate used.

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