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Proposal of physical valuation of constructions in real estate appraisals, the implication of the project factor in Mexico

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ABSTRACT

The project factor complemented the value given to a home analyzed in real estate appraisals. In this paper, the design of the functional analysis methodology of the rooms that make up each house was presented, in combination with the *Ross-Heidecke physical depreciation approach*. Architectural plans of samples of homes in Mexico of all socioeconomic categories were measured and three types of matrices were established for their valuation and percentage parameters. The main type of construction was analyzed under

the scheme of analysis by building items and the rest of the types were examined in a unitary manner. The percentage results of the sampling analysis were directed to matrices of the physical approach and as a whole; with the rating factor of the state of conservation of each building item, with the calculation of a project factor appropriate to each type of housing. The automated analysis, which rated the value of the buildings based on the functionality of each architectural project, complemented the study of physical depreciation. The percentages resulting from the sample calculated how much each room measures in the logic of a simulation, which according to the total area of building and the specific number of rooms, qualified the functionality to unit surfaces. It was emphasized that the functionality analysis includes the qualification of facilities and infrastructure. The result of the functionality factor of the architectural project was subject to the parameters and requirements of housing building codes in Mexico.

INTRODUCTION

The context of the qualification of the building project of each dwelling can be understood; an analysis aimed at considering the functionality of each of the living spaces when carrying out a real estate appraisal.

It is reflected that, as valuation professionals, there is a risk of lightly estimating the calculation of the architectural project of a particular case, since the evaluation that is granted, within the description and the physical approach, is to indicate only with text if it can be considered functional or not. In the best cases, it is possible to indicate the reason why the project is considered to have that classification. But it is done entirely on criteria, without analysis parameters, which makes it a bit arbitrary.

It does not seek to disqualify the criteria of the professional appraiser when considering the functionality of the house room analyzed, but a well-structured and specific methodology offers greater certainty of correct classification and qualification. In addition, that some detail of the functionality of the home can go unnoticed at first glance.

This problem derives from different perceptions, such as an invitation to analyze in detail those architectural projects that within the professional practice of valuation must be qualified and determine a value.

The study aims to support the valuation guild, by presenting a practical calculation, which maintains the quality and accuracy of the appraisals, through the use of automated matrices that allow controlling the valuation calculations.

The spaces of the house are classified into habitable and auxiliary; identifying in both cases the basic and the additional (Mexican Federal Government, 2017). How housing buildings are designed can make their spaces effective according to the type of housing.

There is a tendency to categorize the type of housing, according to the urban area in which it is located; where an architectural project can be classified differently from another similar project that is desolate in another zone. Even, this represents success at the advertising level for sales of these properties.

An example of this is that due to the services that offer some exclusive areas over others of public access, the houses that are in a condominium are sold at a higher price. Although in some cases, the urban equipment if it is remarkable, it should be considered as a surplus-value of the environment and common areas of the referred condominiums, but not for that reason, the house should be specifically considered superior to what it proves to be.

Some examples of housing are cited within all the socioeconomic classifications recognized within the valuation; where you have the *minimum category, economic, social interest, medium, semi-luxury, residential and residential plus real estate.* (Official Journal of the Federation, Sociedad Hipotecaria Federal, 2012) The minimum construction area required by type represents a fundamental aspect in the correct classification of such homes; since, a certainly built surface is required, so that the spaces that characterize the houses can exist. This methodology analysis projects a percentage trend of occupation of each of the housing areas and takes into account the representative classification of the constructions.

There are possibilities to consider for the analysis of the functionality of each of the spaces of all kinds of homes, through generalized automatic calculations. But matrices are designed with formulas and conditions that, from choosing the type of housing, weigh the figures in a specific way, which is complemented by a simulated study of unit costs per construction item. A principle of the success of this proposal is obtained when each home is divided into a set of

specific rooms that have all types of housing, which are: bedrooms, bathrooms, kitchen, social areas, distribution spaces, and the space for services.

An attempt is made to confront the theoretical information presented by the Federal Mortgage Society SHF (2012), which appreciates reality, to reveal the points that can be considered as theoretical gaps. It can be understood that the differences between the theoretical conceptualization and its contrast with appreciations in the practical field have the possibility of generating confusion in the appraisers.

On the other hand, some subdivisions build houses with the same or similar projects in series, which are classified as medium type, and even some more exclusive subdivisions with prototypes that adapt to a higher classification of housing. The SHF (2012), only mentions serial construction projects within the category of social interest.

Within the classifications of the SHF (2012), no ranges of total built area or minimum surfaces by project area are determined. Therefore, it seeks to classify each house within its respective category and determine parameters that match the built area with the areas of the architectural project that are considered necessary according to their classification.

The aforementioned aspects have been analyzed with housing projects developed in several states of the Mexican Republic, where a direct comparison with projects within the Metropolitan Area of Guadalajara, Jalisco, Mexico was taken into account.

The concepts related to the regulations of qualification of constructions that were studied, apply only to the buildings present in Mexico. The context of a conception of housing rooms in architectural projects outside Mexico was taken into account only as a reference and as a point of observation of how some projects of other nations represent living spaces and services in a similar way to Mexican ones; this similar trend is generated because the needs of spaces are finally destined to be inhabited, regardless of cultural or social issues. In addition, when conceptualizing the way to build a home, there may be influences from other countries; as there was the influence of the International Building Code for the elaboration of the Housing Building Code in Mexico. The National Housing Commission (2010) (CONAVI), developed the normative model Housing Building Code (CEV), which was based on the "International Code Council" model.

DEVELOPMENT

The areas of valuation and construction, which have always been or related and in both areas when information about the unit or parametric costs is needed, it is possible to consult specialized manuals in the field. But when you do not have the precise information according to the recent costs of any material, you can estimate a parameter. This is useful when you have to make a quick cost estimate, or as Varela (2000) would call it, "approximate cost estimates".

For its part, Villa (2006) conceives the description of the distribution of spaces and the necessary surfaces for each type of housing, which are expressed in ranges. This can be seen in Table 1.

Table 1.

Classification of homes by type and distribution.

Housing category	Distribution of housing areas	Average building area by type
Popular	Unfinished, with two bedrooms, a bathroom and kitchen.	36.00 - 41.00 m^2
Economic	With two bedrooms, a bathroom and kitchen.	42.00 - 75.00 m^2
Common	No clear definition	75.00 - 165.00 m^2
Media	With three bedrooms, two and a half bathrooms, kitchen.	165.00 - 284.00 m^2
Semi luxury	Four bedrooms, five and a half bathrooms, parking for 3 cars.	284.00 - 419.00 m^2
Luxury	Four bedrooms, five and a half bathrooms; including one with hot tub, another four with tub, service area, and parking for four cars.	419.00 - 625.00 m^2
More	No description mentioned detailed and includes parking for four cars.	625.00 - 863.00 m^2
Premium	With five bedrooms, pool, sauna, parking for 5 cars.	863.00 - 976.00 m^2

Source: Villa, 2006.

López (2011), considered the distribution of spaces necessary for each type of housing, according to conceptualized classifications with a more detailed wording than Villa (2006), with

some similar considerations in the delimitation of space, although there are some differences. See table 2.

Table 2.

Classification of homes by type and distribution.

Housing category	Distribution and characteristics of areas of the house	Surface of average construction by type
Minimum	With multipurpose room without differentiation, with incomplete minimum services, such as sanitary services outside the house.	32.46 m^2
Economic	Construction of a level, with small spaces, but with some differentiation by use: multipurpose area, full bathroom within the same house, and a patio or area of services.	36.30 m^2
Social interest	Construction of one or two levels, with small spaces, but well defined by using: garage for a car, living room, dining room, one or two bedrooms with closet space, one to two bathrooms, kitchen and service patio.	36.00 a 65.00 m^2
Medium (Good)	Construction of one or two levels, of good size, very well defined by using: garage for two cars, room, dining room, two to three bedrooms with closet, two bathrooms, half bathroom, kitchen, interior garden and/or service patio.	126.00 m^2
Semi luxury (Very Good)	Construction of two levels, with spaces of good size very well defined by garage use for two or three cars, room, dining room, kitchen, study, terrace, living tv., three bedrooms with closet, two to three bathrooms, half bathroom, laundry room, utility room, garden interior and exterior and service patio.	330.00 m^2

Housing category	Distribution and characteristics of areas of the house	Surface of average construction by type
Residential (Luxury)	Construction of two to three levels, with good size spaces very well defined by using: covered garage for two to four cars, living room, dining room, study, kitchen, breakfast room, living room T.V., three to four bedrooms with dressing room, three to four bathrooms, half bathroom, laundry and ironing room, utility room with bathroom, terrace, pool, indoor and outdoor garden and service patio.	440.00 m^2
Residential plus (Luxury)	Construction of two to three levels with spaces of good size very well defined by using: covered garage for more than four cars usually in basements, room, dining room, study, kitchen, breakfast room, living room, gym, cinema room, three or more bedrooms with dressing room, three or more full bathrooms, half bathroom, laundry and ironing room, utility room with bathroom, terrace, pool, interior, and exterior garden and patio service.	440.00 m^2

Source: López, 2011.

The breakdown of items taken as a reference by Varela (2019), was considered as an accurate analysis for this type of study by a breakdown of costs. But as the proposal obeys the classification of parameters applied only to constructions and not to external works or special installations; the breakdown proposal was taken as valid (López, 2011).

To conclude with this section, a methodology relevant to the study is described, which is *the physical depreciation of The Ross-Heidecke approach* constructions and is presented below:

This methodology was originally designed to calculate the depreciation of machinery, but over time it has been adapted to qualify constructions of any kind, whether commercial, housing, or industrial. The methodology has been developed within the physical approach of the

appraisal. The costs to be taken into account for each type of property are usually obtained from parametric cost manuals and go according to the type and class of construction.

A new construction replacement value was taken into account, to which depreciation and conservation status factors were applied, to obtain a net replacement value. How the Ross–Heidecke methodology works with the costs of new replacement value (V.R.N), is using a consideration of unit values, of the ones once the V.N.R. has been obtained. It multiplies it by the built area of the property and thus the total value of the buildings is obtained.

The Ross–Heidecke method is formulated mathematically under the concepts of depreciation by age and by physical depreciation; by performing a combination of the methodology called Ross intermediate parabolic line (s / f), with the state of conservation of the constructions (Artavia, 2012).

Based on the analysis of the theoretical framework and the specialized literature, the following research question was established: What characteristics should a reliable method have for the physical valuation of constructions based on the functionality factor of your project, in real estate appraisals in Mexico? From which the hypothesis arose; a methodology can be developed that includes the qualification of the project factor within the physical approach of a real estate appraisal; by assigning a rating of the functionality of each room of any house room studied and that this factor is weighted with the total value of the constructions.

The objective of the study was to propose a method that qualifies the elements that define the efficiency of the design of single-family homes in Mexico and to estimate a project qualification factor, which influences the net replacement value of each home analyzed in real estate appraisals.

METHODOLOGY

The study was descriptive, analytical, and non-experimental. The methodological proposal because is conceptualized in the parameters of a physical approach; it did not have developed within the market approach, nor did it take as a reference the homologation of comparables. One of the factors of homologation of comparables similar to the object of appraisal was the factor of

the functionality of the architectural project, which complements the rest of the factors typified as *factors of the front, background, surface, building, age, state of conservation and result*.

A comparison was established between the types of construction cost estimates, proposed by Varela (2019), to establish a relationship between the time required to invest in each type of estimate and the accuracy that the results of each of the studies may have. Where five types of estimates were determined, which were the following;

1. Approximate or by order of magnitude.
2. Parametric per square meter.
3. By components of construction phases or complete systems.
4. By assemblies of elements or constructive parts.
5. Unit Price (Varela, 2019).

In the following table, the differences conceptualized by Varela (2019) between each of the analyses are explained, where he initially described the type of estimate and then summarized the sources of analysis of each of the data. See table 3.

Table 3.

Technical and temporal details of types of construction analysis.

Estimate type	Overview of the methodology of each estimate
Approximate	Approximate notions of costs that the appraiser has, by experience or by previous talks about the values.
Parametric / m^2	It is said that it is a constant that multiplies the parameter, to obtain the cost of construction normally unit concerning the total built area.
Components the systems	Complete systems that constitute a building are studied. An example is the study of the cost of the foundation, structure, interior finishes, electrical or sanitary installation. It has the advantage of being able to be very precise, but also the disadvantage of being inflexible to eventualities.

Estimate type	Overview of the methodology of each estimate
Assembly / constructive parts	The generalized costs of each of the elements that can compose a system are studied, such as those mentioned in the previous method of components. They are calculated by surfaces type ideal components per construction system.
Unit price	The real cost of each of the constructive elements of each of the systems is studied, it is the slowest of the methods and a working budget works with the same logic. It is the breakdown of costs that takes the longest to complete.

Source: Own elaboration based on Varela, 2019.

Within the types of estimates in the complete systems analysis guideline proposed by Varela (2019), an approach of the detailed description of systems or components was considered, in such a way that each of the phases that constitutes the author in publications of his parametric cost system is explained in detail and the following concepts were taken into account;

Foundation and substructure, up structure, outer structure, interior construction, hydro sanitary installation, electrical installation, general conditions, and specialties, or external reinforcements.

The breakdown presented describes all the construction items to be taken into account when building a house and is typified in the Varela cost manual (2019), by type of housing and by surface. Within this cost per item, the subtotals and totals of the construction are reflected, at the rate of estimating a specific cost for the foundation, for the interior construction, and the electrical and hydro sanitary installations.

For the methodological proposal, a breakdown by items was conceptualized, similar to that of Varela (2019), in which, instead of analyzing the specific cost by item, the percentage representativeness of each of the construction systems by type was broken down.

However, the primary, secondary and tertiary matrices that were developed as a template for the application of the methodological design are presented.

There was a conventional design, with the points that are analyzed within the physical approach of an appraisal within the study of the constructions, to determine their *physical depreciation and their state of conservation*. The boxes that make up this primary matrix are those shown in Figure 1.

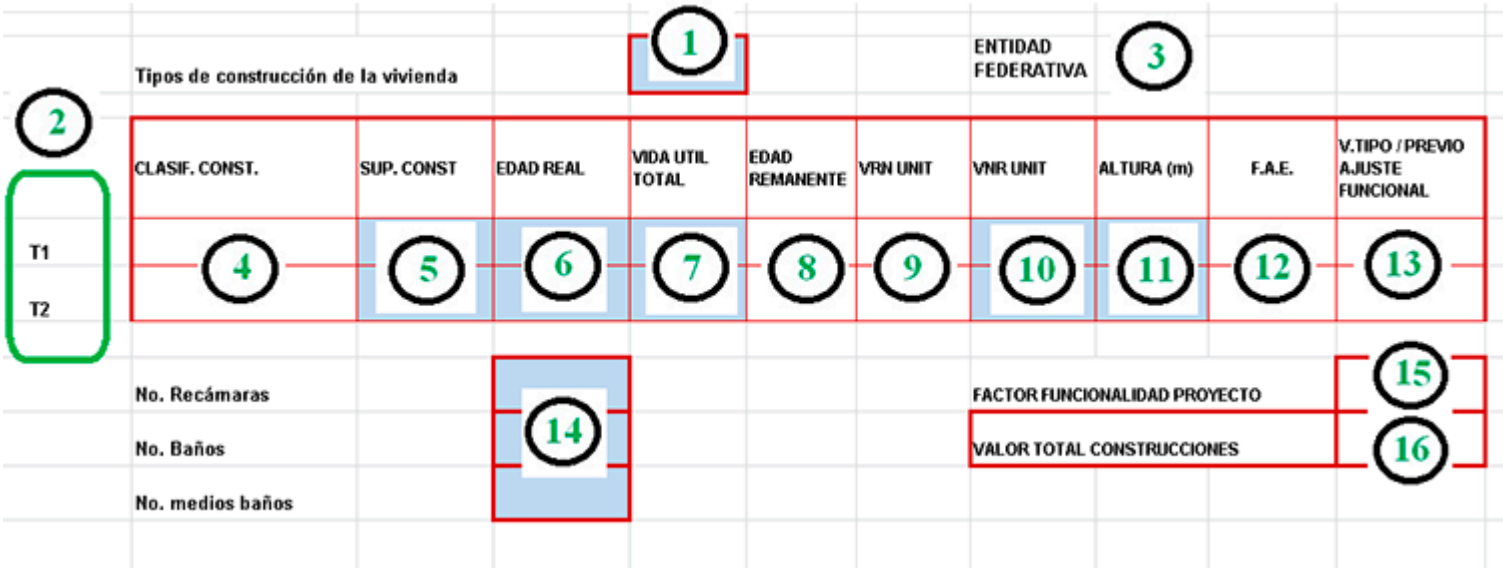

Figure 1. Primary matrix.

Source: Own elaboration.

Literal translation of Figure 1	
Tipo de construcción de viviendas	Types of housing construction
Entidad Federativa	Federal Entity
Clasif. Const.	Construction Classification
Sup. Const.	Sup. Construction
Edad Real	Real Age
Vida Útil Total	Total Service Life
Edad Remanente	Remaining Age
VRN Unit	VRN Unit
Altura (m)	Height (m)
F.A.E.	F.A.E.
V. Tipo / Previo Ajuste Funcional	V. Type / Previous Functional Adjust-ment
No. Recámaras	No. Bedrooms
No. Baños	No. Bathrooms
No. Medios Baños	No. Half Baths
Factor Funcionalidad Proyecto	Project Functionality Factor
Valor Total Construcciones	Total Value of Constructions

Below is the secondary matrix, this type of matrix was configured in an automated way, except for the qualification field of the *Ross Heidecke* criterion which is manual capture. In the

case of the first type of construction, the calculations are analyzed according to a perspective by construction items or as Varela (2019) calls it, analysis by components of construction phases or complete systems.

From the second type of building and the other types presented by the analyzed property; the matrix represents simpler calculations than those made in the first type and uses a similar logic, but oriented to determine the net replacement value of the type in general, in an integral way and without taking into account an analysis of construction items according to Figures 2 and 3.

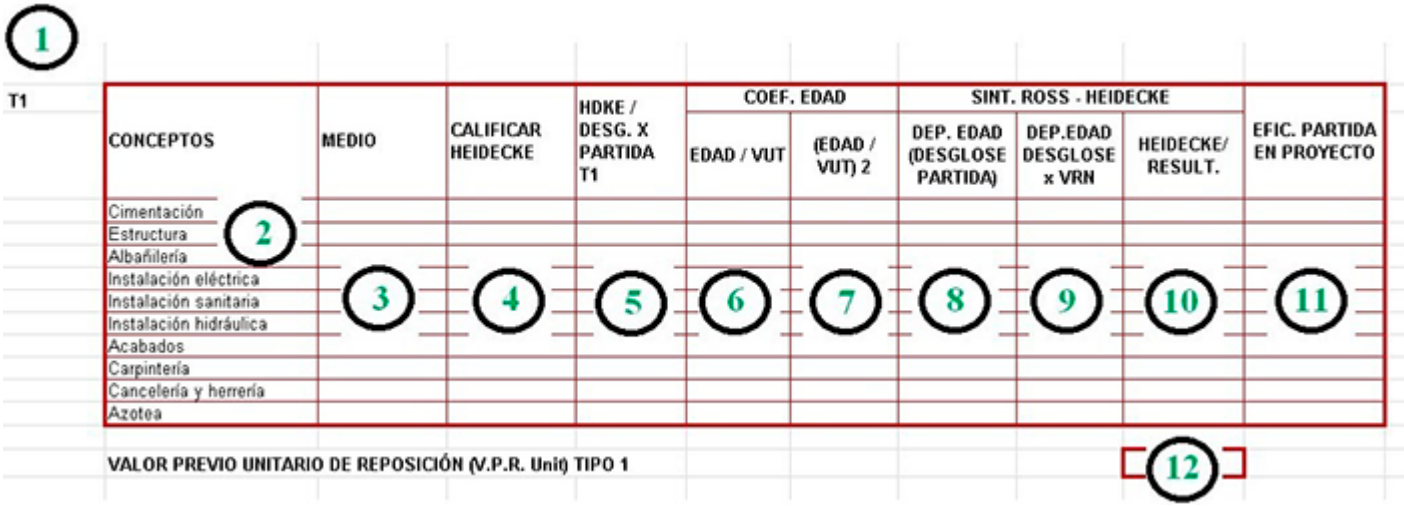

Figure 2.

Secondary matrix, analysis of the first type of building.

Source: Own elaboration.

Literal translation of Figure 2	
Conceptos	Concepts
Medio	Middle
Calificar Heidecke	Classify Heidecke
HDKE / Desg. X Partida T1	HDKE/ Desg X Start
Coef. Edad	Age Coefficient
Sint. Ross. Heidecke	Sint. Ross. Heidecke
Edad / Vut	Age/ Vut
Edad / Vut 2	Age Vut 2
Dep. Edad (Desglose partida)	Dep. Age (Split Breakdown)
Dep. Edad Desglose x VRN	Dep. Age Breakdown X VRN
Heideke / Result	Heideke / Result
Efic. Partida en Proyecto	Efic. Project Item
Cimentación	Foundation

Estructura	Structure
Albañilería	Masonry
Instalación Eléctrica	Wiring
Instalación Sanitaria	Sanitary installation
Instalación Hidráulica	Hydraulic Installation
Acabados	Finishes
Carpintería	Carpentry
Cancelería y Herrería	Cancellation and blacksmithing
Azotea	Flat roof
Valor Previo Unitario de Reposición (V.P.R. Unit) Tipo 1	Previous unit replacement value (V. P.R. unit) Type 1

Figure 3.

Secondary matrix from the second type of building.

Source: Own elaboration.

Literal translation of Figure 3	
Conceptos	Concepts
Medio	Middle
Calificar Heidecke	Rate Heidecke
Puntos Heidecke	Points Heidecke
Coef. Edad	Age coefficient
Sint. Ross. Heidecke	Sint. Ross. Heidecke
Edad / VUT	Age / vut
(Edad / VUT) 2	(Age / vut) 2
Dep. Edad (Desglose Partida)	Dep. Age (Split Breakdown)
Dep. Edad Desglose x VRN	Dep. age breakdown x VRN
Heidecke / Result.	Heidecke Results
Efic. en Proyecto	Project effectiveness
Representación total del tipo de construcción	Total representation of the type of construction
Valor Previo Unitario de Reposición (V.P.R. Unit) Tipo 2	Pre-unit replacement value (VPR unit) type 2

The tertiary matrix corresponds only to the first type of building and was designed with the fields where the synthesis of all the elements that make up the qualification of the architectural project is integrated. Since, in the primary and secondary matrices, the central

focus was physical depreciation, either broken down, by items or integral area of the specific type. Figure 4 explains the tertiary matrix.

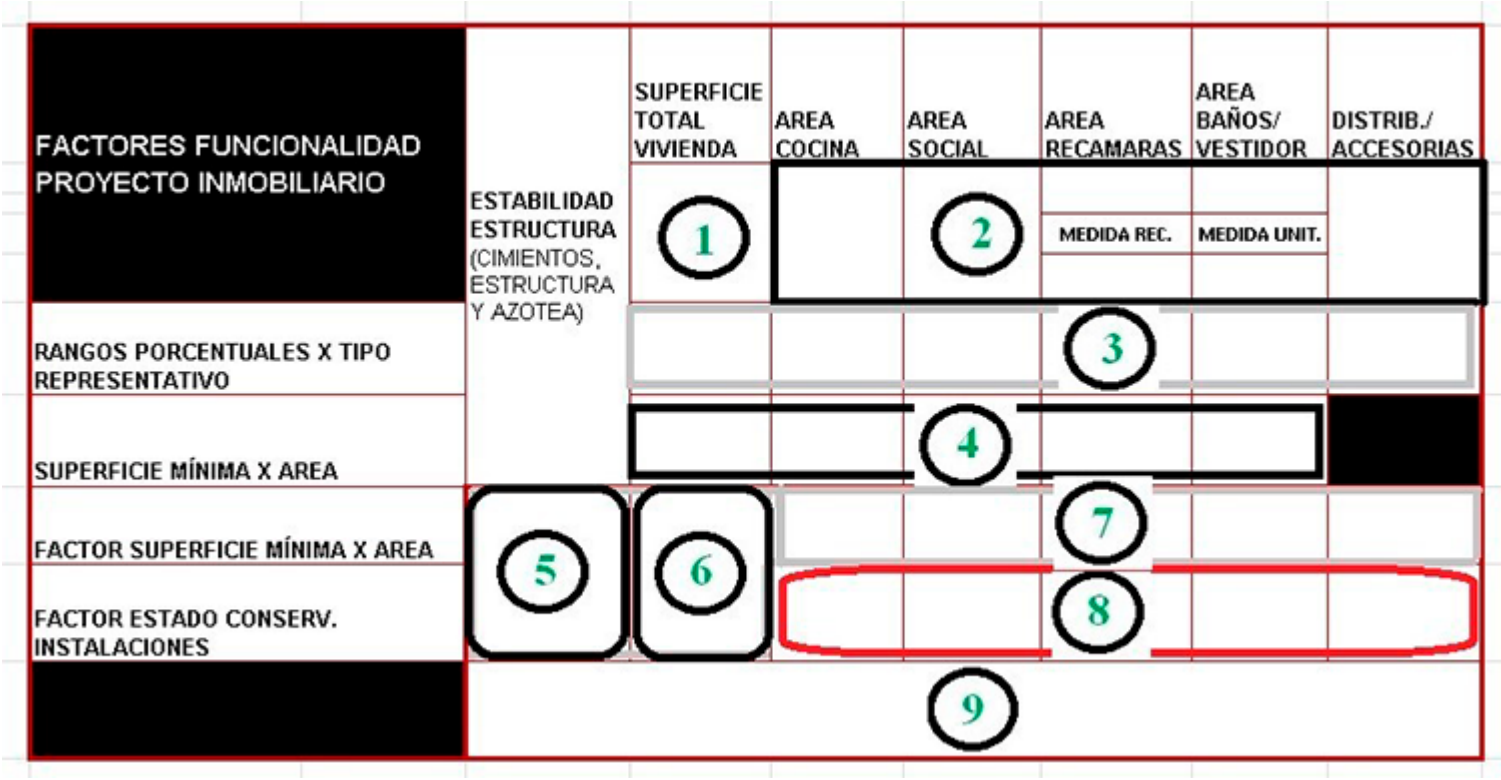

Figure 4.

Tertiary matrix, project efficiency analysis.

Source: Own elaboration.

Literal translation of Figure 4	
Factores de Funcionalidad Proyecto Inmobiliario	Factors functionality real estate project
Rangos porcentuales por tipo representativo	Percentage ranges x representative type
Superficie Mínima X Área	Minimum surface area x area
Factor SuperficieMínima X Área	Minimum surface area x area factor
Factor Estado Conserv. Instalaciones	Factor state conservation facilities
Estabilidad Estructura (Cimientos, Estructura y Azotea)	Structural stability (foundation, structure, and roof)
Superficie Total Vivienda	Total living area
Área Cocina	Kitchen area
Área Social	Social area
Área de Recámaras	Bedroom area
Área de Baños / Vestidor	Bathroom/dressing area
Distrib. / Accesorias	Distributor/ accessory
Medida Rec.	Rec. measure
Medida Unit.	Unit measurement

For the sample, a representative selection of the universe was considered. Semi-new and new dwellings were chosen to obtain the distinctive percentages by type; for the collection of data and analysis of measurements of the specific areas to appreciate the habitability and the percentage variation or similarities, between the diverse classifications of housing.

The samples were divided into eight categories, to classify the sample by a minimum and maximum area of deplanting required by each type of dwelling. Divided from one to eight, each of these categories; included the types of housing that both the SHF (2012) and other authors considered in their conceptualizations, which are summarized in Table 4.

Table 4.

Classification of dwellings by surface according to type.

Housing category	Build surface ranges by type					
	CONAVI (2017)	Varela (2017)	Villa (2006)	Lopez (2011)	UdeG (2013)	Gazette official D.F. (2005)
Type 1	40.00 m^2	36.00 m^2	36.00 - 41.00 m^2	32.46 m^2	30.00 m^2	No data
Type 2	50.00 m^2	43.00 m^2	42.00 - 75.00 m^2	36.30 m^2	45.00 m^2	Clear short no more than 3.50 meters.
Type 3	71.00 m^2	53.00 m^2	75.00 - 165.00 m^2	36.00 a 65.00 m^2	55.00 m^2	Clear short up to 4.00 meters.
Type 4	102.00 m^2	80.00 m^2	165.00 - 284.00 m^2	126.00 m^2	100.00 m^2	Clear short up to 4.50 meters.
Type 5	156.00 m^2	108.00 m^2	284.00 - 419.00 m^2	330.00 m^2	100.00 – 200.00 m^2	Clear short up to 5.00 meters.
Type 6	More than 188.00 m^2	349.00 m^2	419.00 - 625.00 m^2	440.00 m^2	More than 200.00 m^2	Clear short up to 5.50 meters
Type 7	40.00 m^2	646.00 m^2	625.00 - 863.00 m^2	440.00 m^2	30.00 m^2	Clear short greater than 5.50 meters.
Type 8	Not applicable	Not applicable	863.00 - 976.00 m^2	Not applicable	Not applicable	Not applicable

Source: Own elaboration.

Regarding the data collection instruments, all the samples were analyzed with the measurement of the architectural plans that integrate all the practical cases; by quantifying each of the representative areas of each property. The measurements of the *bedrooms, kitchen, living and dining room, stair area, garages, and service* were grouped, as long as these areas were built and not discovered. Thus each area is measured and emptied according to the respective instrument, which was called "Table classifying housing by type". There were three kinds of formats to visualize the construction plans, both of particular designs and of prototypes in subdivisions, in which the measurement of the same had to be adapted.

For data analysis, the mathematical operations that were performed in the sample collection instrument are described, with which the data corresponding to the results was estimated. As a first procedure, an equation was applied in which the percentage representation of each of the specific areas of the house is obtained, concerning the total built area; (specific area for 100% corresponding to all the constructions between the total surface of each house). As a second procedure, the representative percentages of each of the areas that exist in each house analyzed within the sample were added, and as a third procedure; the sum of the percentage that occupies the specific areas of the houses, is subtracted from the entire construction of each house. As a fourth procedure; the proportional individual measure of each chamber of each of the samples was calculated.

RESULTS

As part of the results obtained, the percentage representativeness of the service areas in the types one and two homes was found with an unrepresentative average, which was observed in *1.98%* and *0.65%* of the total representativeness of the construction. This has a logical explanation, since, in most of the prototypes of these more economical categories, the areas intended for services have no construction and are located outdoors. Something similar happens with the percentage destined to the desolate of covered garages; which begin to appear in types three and four.

In the case of the areas destined to stairs inside the house, it could be observed that the larger and more luxurious the construction; they diversify from two to more sections, which are interpreted as main stairs and service stairs. In addition, some larger surface projects have three

or more levels. The more flights of stairs you have and the same have access to various levels of construction, their representativeness tends to increase.

These percentage representations of each specific area of housing in all categories were taken as a direct reference for the determination of the efficiency factors of the percentage spaces required by type, in the tertiary matrix of the template developed for the methodological application. In turn, these factors represented a direct influence on the determination of the project factor of each house analyzed. See table 5.

Table 5.

Synthesis of the results of the percentage representativeness by type of housing.

	COCINA	AREA SOCIAL	RECAM.	BAÑOS / VEST.	SERVICIO	ESCALERAS	COCHERAS	DISTRIBUCIÓN	SUMA PORCENTUAL
TIPO 1	10,14	31,06	44,19	8,57	1,98	0,00	0,00	4,06	**100,00**
						6,04			
TIPO 2	11,05	29,35	43,45	8,15	0,65	4,86	0,00	2,50	**100,00**
						8,01			
TIPO 3	7,93	24,03	31,18	12,34	3,76	7,10	5,86	7,80	**100,00**
						24,52			
TIPO 4	7,67	21,70	26,19	11,55	6,01	5,54	8,42	12,42	**99,52**
						32,40			
TIPO 5	5,79	19,53	20,27	14,51	5,87	7,57	10,17	12,48	**96,19**
						36,09			
TIPO 6	6,07	25,61	20,16	11,40	8,83	4,31	7,62	11,01	**95,02**
						31,78			
TIPO 7	5,84	25,41	17,39	9,83	5,05	5,99	8,93	18,09	**96,51**
						38,04			

Source: Own elaboration.

Literal translation of Table 5	
Tipo 1 ... 7	Type 1 ... 7
Cocina	Kitchen
Área Social	Social Area
Recam.	Bedroom
Baños / Vest.	Bathroom/Dressing Area
Servicio	Services
Escaleras	Stairs
Cocheras	Garage
Distribución	Distribution
Suma Porcentual	Percentage Sum

An important point is made about this study, which in addition, to qualify the depreciation by age and state of conservation in a traditional cost approach; has the advantage of being able to determine an influence of the evaluation of the efficiency of the architectural project of any type of housing in Mexico, with a focus on the minimum requirements of building surfaces and each room per dwelling analyzed within an appraisal, but also with a focus on percentage efficiency of surfaces, based on samples of the same type of building.

Likewise, having designed a template for the analysis of constructions by items and by types of construction, within automated matrices; it is possible to calculate a detailed physical depreciation efficiently and the result of this methodology is achieved with the capture of a few variables of age and qualification of the state of conservation.

Also, it is considered that the depreciation or the surplus-value of the efficiency in the qualification of the architectural project, is not redundant to the traditional physical depreciation, since the determination of the efficiency of the project, is not directly proportional to the desgaste by age and conservation and even new homes can present positive or negative ratings for their architectural design.

Likewise, in the process of results, a real estate appraisal was prepared with the proposed methodology, as part of the exercise of the study carried out; and the conclusions section describes what was relevant.

CONCLUSIONS

As far as the appraisal estimate is concerned, it was interesting to obtain the values of this property, since it was subject to a valuation with a *traditional depreciation methodology of Ross Heidecke* and the value did not turn out to be so different in general terms. However, the considerations that were taken to the house were different.

In a previous appraisal, the property was considered as of *medium quality*, which is close to reality, but presents constructive materials such as special coatings, such is the case, granite in the area of the stairs in a greater percentage of its surface and a differentiation of specific areas with an adequate distribution, taking into account that the house is already 50 years old.

As far as the old constructions of the semi-luxury category are concerned, they were not usually very ostentatious, so it was easy to classify them in the *middle category*. But you have to consider the new replacement values, which are above average and consistent, but fair depreciation must be applied.

The result of the physical value of the construction of the antecedent appraisal was *1,082,740.00 pesos M.N.* and in the methodological proposal of this work was *1,317,266.22 pesos M.N.*, which projects a difference of *234,526.22 pesos M.N.* On the other hand, the total physical value of the previous appraisal, which implies the value of land, construction, and special facilities, was *12,534,660.00 pesos M.N.* and in the methodological proposal the result of *12,769,186.22 pesos M.N.* was obtained, which implies the same difference that is obtained from the exclusive analysis of the constructions.

The relevance of the study carried out is that this difference in value is not so representative in the practical case, but by using the methodological proposal of this work, all the facilities of the house can be qualified according to their real state and starting from costs more representative of the type of construction of this property. In addition, it takes into account factors of surplus value in the design of the house, as well as qualifies as obsolete some aspects that are no longer considered functional within the architectural design.

The reason for punishment that this house had, was due to the number of bathrooms, which only have two complete and a half bathrooms. According to the sample collected, the house considered as semi-luxury has at least three full bathrooms, but as it is a house that is several years old, the number of bathrooms does not necessarily match the number of rooms, which is determined at least three for this type of housing, although if it meets the minimum kitchen surfaces, of social and distributive area for the bedrooms and bathrooms.

It was considered convenient to replace the electrical, hydraulic, and sanitary installations since these have not been changed for years and present operational problems. This was contemplated in the depreciation by State of Conservation of Ross-Heidecke and analysis by construction items (secondary matrix) and was contemplated in the warning boxes of the tertiary matrix; the notice of review of these facilities directs the appraiser to mention it in the statements and warnings. Also, the house has a relatively old structure but does not

present a structural risk, and remodeling is appreciated in some surface finishes, these states of conservation are contemplated in the second matrix.

To finish with this section, it is understood that it is of importance to carry out studies similar to the one that was carried out, where other *matrices of the weighting of indicators* are offered that allow the valuation professional to limit all the characteristics of the variables of an appraisal, so that the estimation of the well-investigated approaches the real, therefore, it will be interesting that there are new opposites in the various types of tangible or intangible goods, regardless of *geographical location, time and valuation conditions*.

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