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Age-Friendly Cities Performance Assessment Indicators System hierarchization

Jerarquización de un Sistema de indicadores para la evaluación de desempeño de las Ciudades Amigas de los Ancianos

Hierarquização de um Sistema de Indicadores para avaliação das Cidades Amigas dos Idosos

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ABSTRACT: This study aimed to validate and prioritize a system of indicators to assess the performance of age-friendly cities. The methodological procedures consisted of the application of the system indicators content validation model developed by Fehring in 1987 and used the multicriteria method Analytical Hierarchy Process for priorization. These analyzes, there was a satisfactory level of consistency and correspondence between the position of the experts on the prioritization of active ageing issues in urban environments.

Keywords: Age-friendly cities; Active Ageing; Public Policy; Performance Measurement System; Multi-criteria decision.

***RESUMEN**: Este estudio tuvo como objetivo validar y priorizar un sistema de indicadores para evaluar el desempeño de las ciudades amigables de los mayores. Los procedimientos metodológicos consistieron en la aplicación del modelo de validación de contenido de indicadores del sistema desarrollado por Fehring en 1987 y utilizaron el método de jerarquización analítica multicriterio para la priorización. En estos análisis, hubo un nivel satisfactorio de coherencia y correspondencia entre la posición de los expertos sobre la priorización de los problemas de envejecimiento activo en entornos urbanos.*
***Palabras clave**: Ciudades Amigas de los Mayores; Envejecimiento activo; Política Pública; Sistema de medición del rendimiento; Decisión multi-criterio.*

***RESUMO:** Este estudo teve como objetivo validar e priorizar um sistema de indicadores para avaliar o desempenho de Cidades Amigas do Idoso. Os procedimentos metodológicos consistiram na aplicação do modelo de validação de conteúdo de indicadores do sistema desenvolvido por Fehring em 1987 e utilizou o método multicritério Analytical Hierarchy Process para priorização. Nestas análises, houve um nível satisfatório de consistência e correspondência entre a posição dos especialistas na priorização de questões de envelhecimento ativo em ambientes urbanos.*
***Palavras-chave**: Cidades Amigas dos Idosos; Envelhecimento Ativo; Políticas Públicas; Medidas de Desempenho; Decisão Multicritério.*

Introduction

According to UN data (UN), the world population of individuals age 60 or over will double in proportion, from 11% in 2010 to 21.8% in 2050, representing, in absolute numbers, about two billion senior citizens (Pinheiro, *et al*., 2015; Henkens, & Schippers, 2012; UN, 2009; UN, 2002; WHO, 2007).

Population ageing is a result of the decline in fertility rates in some countries, in which the fertility rate is below the replacement rate (average rate of 2.1 children per woman), especially when combined with the increase in life expectancy, which may be provided by

some factors, such as the adoption of healthy lifestyles and active participation in health care in all stages of life (Muenz, 2007; WHO, 2002).

Aware of the phenomenon of population ageing, the UN held the Second World Assembly on Ageing, in 2002 in Madrid, defining the guidelines that are to guide public policies on the elderly population for the twenty-first century. The proposals resulting from this event were based on a new idea of old age, built around the concept of Active Ageing (Fonte, 2002, p. 1).

The term active ageing began to be adopted by the WHO in the late '90s to denote, 'the process of optimizing opportunities for health, participation and security in order to enhance quality of life as people age' (WHO 2007, p. 12).

The Active Ageing approach is based on the recognition of human rights for the elderly and the principles of independence, participation, dignity, care and self-realization established by the UN (Ribeiro, & Paul, 2011).

The "Research Agenda on Ageing for the 21st Century", a joint project of the United Nations Programme on Ageing and the International Association of Gerontology and Geriatrics, also emphasized the need for development of indicators to monitor and evaluate policies and programs on ageing between one of the priority research themes (UN, 2007a, p. 9). In this context, this paper aims to propose a system of indicators validated by experts and legitimized by society, considering hierarchy for the proposed system.

The Decision Making

According to Jara (1998), the days of development driven by a centralized, exclusive state are apparently coming to an end. The new sustainable development strategies start introducing concepts of finite resources, whether natural or financial, and appreciation of space, social justice and recovery of citizenship, democratic and participatory governance, self-management and local democracy, institutional partnership and responsibility.

For Easton (1957), the study of politics has to do with understanding of how decisions are made and implemented by public decision-makers on behalf of society. In the same vein, Wildavsky (1979) points out that the term "policy" refers to a process of decision-making, but also the product of this process. However, Peters (2012) defines public policy as the sum of

the activities of governments, acting directly or through delegation, and influencing the lives of citizens.

The formulation of public policies involves, in addition to governments, political parties and interest groups, each with varying degrees of influence depending on the type of policy formulated and coalitions that are part of the government (Souza, 2006).

The theoretical and methodological model of the cycle of public policy tries to explain the interaction between intentions and actions, while seeking to unravel the relationship between the social, political and economic on the one hand, and the government on the other (Lima, & Ascenzi, 2013; Kingdon, 2011; Coveney, 2010).

Kingdon (2011) highlights governmental and non-governmental actors as participants in the decision-making process:

• State actors - are members of their own administration (President, Executive and appointed members to exercise commissioned public office), parliamentarians and members of the career service;

• Actors non-governmental - are lobbyists or interest groups, such as academics, researchers and consultants, press, political parties and public opinion.

The central idea made explicit by Kingdon, according to Baptista and Resende (2011), is that some actors are influential in the formulation of government agenda, and others exert greater influence in policy alternatives.

For Kingdon, the main developer of the theory of public policy cycle, the window of opportunity arises from the union of the three currents that affect the formulation of the policy agenda (multiple streams): the flow of problems, alternative solutions and the political process. These currents are independent and develop according to their own rules and dynamics, flowing through the system with force to cause a change in policy, according to their combination (Pinto, 2008).

Decision-making tools

Decision making is a major challenge facing the managers working in the public or private sector, becoming more complex as it involves subjective variables in the value judgment.

Indicators and Indices

It can be said that despite proving extremely useful and practical to the manager, the use of indicators requires a preliminary effort for collecting and processing information properly and in a manner methodologically consistent with the identified needs (Gomes, *et al*., 2000, p.11).

The term indicator is a variable selected and considered alone or in combination with others to reflect on system conditions under review. Usually an indicator is used as a pretreatment to the original data (Siche *et al.*, 2007). The aggregation of information will speed up the decision-making process by reducing the complexity and diversity of information available. However, if the criteria chosen for data analysis, choice of indicators and definition of the indices are not adequate, the aggregation of information may be compromised (Laura, 2004).

A major difficulty found in a decision-making process that involves multiple factors is the manner in which the relative importance of each factor is quantified, since they may have varying importance for each decision maker (Daniel, *et al.*, 2010). In this sense, defined weights are commonly assigned to the criteria in order to reflect the relative importance of each criterion (Silva, Cândido, & Martins, 2009).

Multicriteria analysis

The technique called Analytical Hierarchy Process (AHP) was developed at the Wharton School of Business by the mathematician Thomas Saaty in order to facilitate the solution of complex problems related to decision making (Islam, & Saaty, 2010; Liberatore, & Nydick, 2008; Costa, 2006; Costa, 2003; Saaty, 2000; Saaty, 1987; Saaty, 1977).

The AHP methodology seeks to integrate different dimensions of analysis in a structured and systematic way. Through this, weights and priorities are derived from a set of subjective judgments made by assessors or participants involved in the process (Silva, Candido, & Martins, 2009). The model also allows the development of a hierarchical structure in which displaying the relationships between the main goal or objective to be achieved and the other elements considered in the decision-making process (Costa, 2006).

The AHP is based on a **nxn** square matrix of **n** comparison criteria, where they are arranged in the same order along the rows and columns. Thus, the $\mathbf{a_{ij}}$ represents the relative importance of the criterion of **i** face line at the discretion of column **j**, as the expression 1 (Berrittella *et al.*, 2007).

$$\mathbf{a_{ij} = 1/a_{ji}} \quad \text{and} \quad \mathbf{a_{ii} = 1} \tag{1}$$

This matrix is therefore a reciprocal matrix. For example, if the criterion of line **i** = 1 is three times more important than the criterion of column j = 5 then $\mathbf{a_{1.5}} = 3$ and $\mathbf{a_{5.1}} = 1/3$. This implies that only half of the upper triangular matrix needs to be evaluated since the other half comes from this main diagonal and unitary assumes values. All the diagonal cells receive a value of 1, since equality is established between the criteria laid down in rows and columns (Costa, 2003, p. 53).

The determination of weights to the criteria by Analytical Hierarchy Process is made in three main steps, detailed below (Costa, 2003):

Step 1: Construction of a pairwise comparison matrix

For the realization of a pair compared to pair, it is necessary to define a scale in order to normalize all made judgments. Saaty (1987) presents a specific scale to standardize the evaluators value judgments. For Ishizaka and Labib (2011, p. 14337), there is no theoretical reason to restrict the scales to these numbers and verbal gradation suggested by Saaty (1987).

According to Costa (2006, p. 73), the collection of judgments in AHP can be further adapted to the characteristics of the observed phenomenon and performed in variations of Saaty scales (verbal and numerical).

Step 2: Obtainment of criteria weight (Calculation of Principal Autovector W)

For any matrix **A**, it is possible to calculate the vector $\mathbf{W_i}$ for the resolution of the expression system 2:

$$\mathbf{A = \lambda_{máx} W_i} \tag{2}$$

Where **A** is the pairwise comparison matrix; $\mathbf{W_i}$ is the vector of relative weights and $\mathbf{\lambda_{máx}}$ is the maximum eigenvalue of the matrix **A**.

Saaty (1977) showed that the resulting eigenvector of the maximum eigenvalue of the matrix **A** reflects the priority of factors and preserves the ordinal preference between the alternatives.

The values of the $\mathbf{W}_i$ vector can be obtained by equation 3.

$$w_i = \left(\prod_{j=1}^{n} a_{ij} \right)^{1/n} \Big/ \sum_{k=1}^{n} \left[\left(\prod_{j=1}^{n} a_{kj} \right)^{1/n} \right] \quad (3)$$

In a simplified way, the resolution of this equation involves the following operations:

– Sum of the values of each column of the pairwise comparison matrix;
– Divide each element of the matrix by the sum of the column to which belongs. The resulting matrix is called standardized pairwise comparison matrix;
– Obtaining $\mathbf{W}_i$ by dividing the sum of the standardized scores of each row of the matrix by the number of evaluated criteria. This provides an estimate of the relative weights of the criteria being compared.

The máximum eigenvalue ($\lambda_{máx}$) is obtained by equation 4.

$$\lambda_{máx} = 1/n(W'_1/W_1+W'_2/W_2+...+W'_n/W_n) \quad (4)$$

The vector **W'** is obtained as follows:

$$W' = A \times W_i \quad (5)$$

Then, calculate the final weights from equation 6:

$$\text{Pesos} = W_i/\lambda_{máx} \quad (6)$$

Step 3: Calculating of consistency ratio (CR)

The inconsistency is associated with inability or difficulty of evaluators in issuing consistently value judgments (Costa, 2006). The degree of consistency provides a measure of the accuracy or consistency of the judgments made and is obtained by Expression 7.

$$CR = RI/CI \quad (7)$$

The value of CI is obtained by expression 8.

$$CI = (\lambda_{máx} - n)/(n - 1) \quad (8)$$

Saaty (1977) proposed values for RI by calculating the average CI values obtained for randomly generated reciprocal matrices (table 1).

Table 1 – Random Index

Size	1	2	3	4	5	6	7	8	9	10
RI	0,00	0,00	0,58	0,90	1,12	1,24	1,32	1,41	1,45	1.49

Source: Adapted from Costa (2003).

Methodological procedures

For the development of this research, it was initially necessary to select a group of municipalities to form the database for analysis and validation of the hierarchy of the proposed system. A selection was then made for all the municipalities with a population between 20 and 100 thousand inhabitants, being the range of representative average population of Portuguese municipalities (34.53%), totaling 78 municipalities of the Portuguese mainland.

Among the 78 municipalities selected, the municipality of Trofa was chosen for the application of the model to a specific case considering the fact that it is a young municipality, created in 1998, and still relies on a resident youth population, mean age 39 years, the majority residing in the city of Trofa (55.41% of the resident population), the county seat.

Validation of indicators

The conceptual framework of this model is based on the concept of active ageing adopted by WHO (UN, 2002, p. 12) recognizing that, in addition to health care, there are other factors that affect how individuals and populations age, namely the need of the elderly to feel safe in the environment they live in, in terms of income, violence and social support, and the need that the elderly have to feel participative and productive, contributing actively in the family and in the community (WHO 2005; Kalache, *et al*., 2002).

According to WHO (2009), active ageing depends on a variety of influences or determinants that surround individuals, families and nations, among which include material conditions and social factors that affect the types of behavior and feelings of each individual. Many aspects of the scenarios and urban services reflect these determinants and are included in the characteristics of age-friendly cities.

The step of validation of indicators of the information system was presented in Pinheiro, *et al*. (2015).

Hierarchy of the indicator system

The hierarchy sought to identify, among the indicators of system variables, which the order of importance (priority) perceived by local social actors, so that organized society can contribute to decision making in policies and practices to provide for more age-friendly cities. The methodology proposed here sought to legitimize subjective value judgments, assuming that subjectivity is present in the decision-making process.

The technique consisted of a questionnaire in spreadsheet for analysis of the relative importance of indicators, according to the subjectivity of social actors. The collection, analysis and interpretation of the data were performed by multi-criteria technique Analytic Hierarchy Process - AHP (figure 1).

What is the relative importance of the criteria below to evaluate the performance of Trofa as Age-Friendly City?

Dimensions	Security	Health	Participation
Security	1		
Health		1	
Participation			1

Consistency Rate	If CR > 0,10 - Revise their Judgments	CR
	If CR ≤ 0,10 – consistent Judgments	0.00

Escala Numérica

1 = Equal Importance between Line and Column

2 = Line Little More Important than Column	1/2 = Line Little Less Important than Column
3 = Line More Important than Column	1/3 = Line Less Important than Column
4 = Line Much More Important than Column	1/4 = Line Much Less Important than Column
5 = Line extremely More Important than Column	1/5 = Line Extremely Less Important than Column

Figure 1 – Electronic Spreadsheet of AHP

The judgment was based on a scale displayed next to each of the comparison matrices. When choosing one of the suggested values, determined to relative importance of the criteria analyzed, the more important one major criterion was indicated, the more attention it should receive from decision-makers, that is, the judges should judge most important criteria they deemed most in need of attention from policy makers.

Analysis and Validation of the Hierarchy

This stage of the research aimed to analyze and validate the ranking of indicators from the comparison between the weighting and the actual performance of Trofa, for each indicator, with respect to each of the 77 municipalities that of which the research database was composed.

To analyze the hierarchy of indicators, the calculation was initially made for each indicator of performance in relation to all municipalities of Trofa previously selected according to the indicators standardized methodology.

For the standardization of indicators, a standardization was recommended using the method of transformation of all variables to values between 0 (worst situation observed) and 1 (best observed situation), as Sepúlveda (2005, p. 239).

This avoids the effects of variances of unity and the generation of negative scores. For any variable x, the value of the variable transformed 0-1 for the ith observation can be obtained by the expressions 9 or 10, considering the positive or negative relationship of each variable with the municipality's performance.

- Positive relationship:

$$\mathbf{I = (x - m) / (M - m)} \quad (9)$$

- Negative relationship:

$$\mathbf{I = (x - M) / (m - M)} \quad (10)$$

Where: I - index calculated for the examined county; x - value of each variable to the municipality; m - minimum value of the variable in the municipalities; M - maximum value of the variable in the municipalities.

This research adopted a performance scale, where for a relative position between the 78 municipalities participating in the survey range between values from 0.76 to 1.00 corresponds to performance called "Ideal"; values between 0.51 to 0.75 corresponds to performance "Acceptable"; values between 0.26 to 0.50 corresponding to performance of "Alert" and values ≤ 0.25 representing a “Critical” performance.

The validation of information is based on the highest level of importance assigned by social actors of a given indicator and should correspond to a situation classified as "critical" in the performance classification. On this same basis, the lowest level of importance assigned by

social actors for an indicator should coincide with an "Ideal" situation in the model taken as the basis for comparison of information.

For intermediate levels of performance, situations of "Alert" and "Acceptable", the necessary interpolations were made, keeping the same reasoning used to analyze performances of "Critical" and "Ideal".

Starting from the assumption that subjectivity is present in the decision-making process, the methodology proposed here sought to legitimize these subjective judgments.

Results and Discussion

The study of discursive matrix adopted by the conceptual model applied to the context of urban communities from the Portuguese mainland, and the criteria listed in the methodology for identification and selection of indicators, and made it possible to build a system of indicators that adopts the dimensions, the three pillars of the structure policy for active ageing:

• Security, in a vision of physical protection and social support to the elderly;
• Health, a vision of physical infrastructure and personnel provided by the municipality, in addition to the delivery of public policy in promoting a healthy and long-lived ageing for residents; and
• Participation in a vision of civic activities, socio-cultural, educational and employment of the elderly in the family and in society.

For each dimension critical factors were identified related to the determinants of active ageing, here called themes, which guided the identification and selection of indicators.
The security dimension is structured with four themes, namely: housing, open spaces, transport and social and financial protection.

Regarding the theme of housing indicators, which aims to evaluate performance in terms of quality of housing, the relationship of occupation and use of technology as an ally to prevent premature institutionalization of the elderly, five indicators were identified and selected.

Regarding the theme of outdoor spaces, which corresponds to the indicators that seek to demonstrate the relationship of individuals with the territory, its safety and environmental quality, five indicators were identified and selected.

Regarding the theme of transport, the three indicators identified and selected deal with aspects of mobility and its safety for the elderly, the availability of urban public transport and the presence of civil protection, with emphasis on emergency relief and transportation of patients.

The theme of social and financial protection comes with a set of five indicators that aim to evaluate the manner in which the elderly are assisted in terms of financial resources and social responses in the community, without losing sight of the sustainability of social protection systems.

The health dimension is structured with three themes and nine indicators related to infrastructure offered to the population and how this is reflected in the quality of life and longevity of the local population.

The scale participation has three themes and eleven indicators related to civic, educational and labor participation and socio-cultural participation of the elderly in the family and community.

To achieve the proposed objective, it was necessary to undertake the following steps:

In validation of the indicators, the results of the weighted arithmetic mean according to the choice of the 20 experts are presented in Table 2 according to the classification adopted for the same (Pinheiro, *et al.*, 2015, p. 628).

Table 2 – Classification of indicators by experts

Indicators of the Health Dimension	Principal Indicators	Supplementary Indicators	Excluded Indicators
Access to basic health services	0.90	–	–
Early mortality of elderly	0.90	–	–
Nurses per capita	0.82	–	–
Doctors per capita	–	0.79	–
Ageing index	–	0.75	–
Longevity index	–	0.74	–
Beds per capita	–	0.69	–
Pharmacies per capita	–	0.68	–
Difficulties among elderly residents	–	0.63	–
Indicators of the Security Dimension			
Accessibility to buildings	0.94	–	–
Tele Care domiciliary	0.93	–	–
Social facilities	0.90	–	–
Average value of the old age pension	0.88	–	–
Elderly person households	0.87	–	–

Proportion of old age pensioners	0.87	–	–
Crime rate	0.84	–	–
Potential Support Ratio	0.82	–	–
Adequacy of housing	0.82	–	–
Accidents road with elderly	0.81	–	–
Senior citizen card	–	0.78	–
Public Transportation access	–	0.76	–
Urban green spaces	–	0.72	–
Density population elderly	–	0.68	–
Firefighters per capita elderly	–	0.68	–
Overcrowded accommodation	–	0.66	–
Spending on environment	–	0.63	–
Population density	–	–	0.51
Indicators of the Participation Dimension			
City council of the elderly	0.87	–	–
Collectivities access	0.84	–	–
Literacy rate	0.84	–	–
Employment rate of the elderly population	0.82	–	–
Cultural facilities	–	0.78	–
Bank volunteer	–	0.71	–
Compulsory education	–	0.71	–
Telecommunications access	–	0.68	–
Participation in elections	–	0.66	–
Official website of city	–	0.63	–
Spending on culture and sport	–	–	0.59

For standardization of the indicators used in this research, the following indicators were considered as negative relationships with the index:

- Security Dimension: Overcrowded Accommodation, Elderly Person Households, Crime Rate, Accidents on the Road with Elderly;
- Health Dimension: Ageing index, Early Mortality of Elderly, Difficulties among Elderly Residents;
- Participation Dimension: None.

Step 2: Identification and Selection of Social Local Actors

This task aimed to form a multidisciplinary team able to contribute in defining the relative importance of the indicators in the indicator system. The identification of the actors went through the County Social Action Local (CLAS), the executive body of the municipality of Trofa Social Network.

The actors were selected in the institutions that somehow act to provide quality of life for the elderly. A total of 55 social actors, operating in about 91.7% of the partner organizations of the social network of Trofa, participated in the survey.

The profile of the social actors involved in the research is characterized by a wide variety of practice areas, where 87.3% have higher education (undergraduate and masters), in areas such as social work, psychology, sociology, management, nursing, engineering, and economics, among others, and 12.7% reported that they had training at the level of 12 years. It is noteworthy also that the consulted social actors are mostly female (71%).

As for the professional performance, 72.73% claim to have over 5 years of professional experience in the area in which they operate, and only 7.27% have less than 2 years of professional experience. With regard to local knowledge, 61.82% live in the city and, of these, 82% have lived there for more than five years.

In an attempt to approach the real situation, here represented by the statistical data calculated by the official bodies of statistics, and theorizing about the real, here represented by the hierarchy by local social actors, there was an empirical and exploratory study to compare information generated from 36 indicators, comparing the ranking by social actors with the reality of statistical data for Trofa.

In this context, the aim of this analysis was to build a system of consistent and hierarchical information, seeking to prove coherent levels and representativeness of the statistical information available to the local and community perception, feeling, in the foreground, the positive or negative impacts on public policy.

The weighting of the dimensions, themes and indicators of the indicator system proposed by Pinheiro *et al.* (2015) resulted in the hierarchy shown in Table 3.

Table 3 – Hierarchy of Indicators System by Social Actors

Dimension	Weight	Themes	Weight	Indicators	Weight
Security	0.292	Housing	0.330	1. Elderly Person Households	0.242
				2. Adequacy of Housing	0.231
				3. Accessibility to Buildings	0.207
				4. Overcrowded Accommodation	0.170
				5. Tele care Domiciliary	0.150
		Outdoor Spaces	0.155	6. Crime Rate	0.383
				7. Density Population Elderly	0.238
				8. Urban Green Spaces	0.221
				9. Spending on Environment	0.159
		Transport	0.190	10. Public Transportation Access	0.448
				11. Firefighters per Capita Elderly	0.304
				12. Accidents Road with Elderly	0.248
		Social and Financial	0.325	13. Potential Support Ratio	0.282

		Protection		14. Average Value of the Old Age Pension	0.245
				15. Social Facilities	0.208
				16. Proportion of Old Age Pensioners	0.175
				17. Senior Citizen Card	0.090
Health	0.500	Physical Infrastructure	0.230	18. Access to Basic Health Services	0.510
				19. Beds per Capita	0.304
				20. Pharmacies per Capita	0.186
		Infrastructure Human Resources	0.270	21. Doctors per Capita	0.510
				22. Nurses per Capita	0.490
		Collective Performance in Healthcare	0.500	23. Early Mortality of Elderly	0.298
				24. Difficulties among Elderly Residents	0.280
				25. Ageing Index	0.215
				26. Longevity Index	0.207
Participation	0.208	Civic Participation	0.302	27. City Council of the Elderly	0.438
				28. Bank Volunteer	0.282
				29. Participation in Elections	0.280
		Educational and Laboral Participation	0.388	30. Literacy Rate	0.412
				31. Employment Rate of the Elderly	0.307
				32. Compulsory Education	0.281
		Sociocultural Participation	0.310	33. Collectivities Access	0.335
				34. Cultural Facilities	0.285
				35. Telecommunications Access	0.256
				36. Official Website of City	0.124

In the process of ranking the highest level of importance of the dimensions of the conceptual model considered in evaluating the performance of Trofa, it was observed that local social actors indicated health as the most important aspect, i.e. the one that currently deserves more attention from policy makers, giving through the AHP method of paired comparison, the average score of 0.500 which together with the other dimensions totals the value of 1.00 according to table 3.

Analysis and validation of the hierarchy of indicators of Health Dimension

From the analysis of the trial of Dimension Health indicators by experts and social actors as well as the reality of the statistical data collected by official statistical agencies, we can see that the Trofa, compared to the other municipalities of the research, has a “Critical” performance in 55.56% of the indicators, with 33.34% in situation of "Alert", and only 11.11% with "Ideal" performance, where no indicator was rated "Acceptable" (table 4).

This reality of statistical data on health confirms the perception of social actors in place the dimension health with higher order of priority in policy for the improvement of the elderly quality of life in the city.

Tabela 4 – Analysis and validation of the hierarchy of indicators of Health Dimension

Indicators	Classification of Indicators of Health Dimension		
	Experts	**Social Actors**	**Relative Performance**
Early Mortality of Elderly	Principal	1.º	Critical
Difficulties among Elderly Residents	Supplementary	2.º	Alert
Ageing Index	Supplementary	3.º	Ideal
Longevity Index	Supplementary	4.º	Critical
Doctors per Capita	Supplementary	1.º	Critical
Nurses per Capita	Principal	2.º	Critical
Access to Basic Health Services	Principal	1.º	Alert
Beds per Capita	Supplementary	2.º	Critical
Pharmacies per Capita	Supplementary	3.º	Alert

When comparing the scores given by the experts with those given by social actors, indicators that receive a rating of "Principal" by experts obtained the classification level of importance in decision making in the first (1º) and second (2º) from social actors. Thus, those criteria considered essential in the model were defined as criteria that could greatest concern for decision makers in the formulation of public policies.

Comparing the perception of social actors to the classification of the relative performance of Trofa, it was found that, when the actors prioritize a criterion in the first (1º) and second (2º) level of importance, the relative performance in Trofa was classified as "Critical" or "Alert", showing a line of perception of the actors with the reality of Trofa.

For Ageing Index classified as "Ideal" in relative performance scale, social actors in Trofa attribute the 3rd order of importance rating, thus demonstrating that this analysis, as well, is in line with the validation criteria of the hierarchy.

Analysis and validation of the hierarchy of indicators of Security Dimension

From the analysis of the judgment of the size of safety indicators by experts and social actors, as well as the reality of the statistics, it was noted that Trofa, compared to the other municipalities of the research, has an “Ideal” performance in 41.18 % of indicators, while 11.76% are in an “Acceptable” position and 17.65% of the performance indicators were considered "Alert", and “Critical” performance was also observed in 29.41% of indicators (Table 5).

The reality of this statistical data on the safety of the elderly in Trofa confirms the perception of social actors and place security dimension in the second order of priority in policy for the improvement of the quality of life for the elderly.

Table 5 – Analysis and validation of the hierarchy of indicators of Security Dimension

Indicators	Classification of Indicators of Security Dimension		
	Expert	Social Actors	Relative Performance
Elderly Person Households	Principal	1.º	Ideal
Adequacy of Housing	Principal	2.º	Acceptable
Accessibility to Buildings	Principal	3.º	Ideal
Overcrowded Accommodation	Supplementary	4.º	Alert
Tele care Domiciliary	Principal	5.º	Ideal
Potential Support Ratio	Principal	1.º	Ideal
Average Value of the Old Age Pension	Principal	2.º	Acceptable
Social Facilities	Principal	3.º	Critical
Proportion of Old Age Pensioners	Principal	4.º	Alert
Senior Citizen Card	Supplementary	5.º	Ideal
Public Transportation Access	Supplementary	1.º	Critical
Firefighters per Capita Elderly	Supplementary	2.º	Alert
Accidents Road with Elderly	Principal	3.º	Ideal
Crime Rate	Principal	1.º	Ideal
Density Population Elderly	Supplementary	2.º	Critical
Urban Green Spaces	Supplementary	3.º	Critical
Spending on Environment	Supplementary	4.º	Critical

There was an inversion in perception only in the indicators Accidents Road with Elderly and Tele care Domiciliary, probably the perception that in Trofa these indicators have an “Ideal” performance.

The theme of Transportation, when establishing a comparison of the perception of social actors, who prioritized a criterion in 1st and 2nd level of importance, there is full agreement regarding the relative performance of Trofa, classified as "Critical" or "Alert".

In the other thematic identifies a certain discrepancy between perception and actual performance. This disparity can be explained by the relative Trofa performance rating "Ideal" being in the majority in the other thematic leading actors to prioritize probably the perception of worse position at the conceptual level. For example, the indicators Elderly Person Households, Potential Support Ratio and Crime Rate, even with performance "Ideal" were considered as a top public policy priority action. For the performance situation "Acceptable", there is a full agreement with the prioritization by the actors in second order of priority.

Analysis and validation of the hierarchy of indicators of Participation Dimension

From the analysis of the trial of the indicators of size ownership by experts and social actors, as well as the reality of the statistical data collected by official statistical agencies, we can see that Trofa, compared to the other municipalities of the research, has a performance considered "Ideal" in 50% of the indicators, 10% of which are in a position considered "Acceptable", 10% of the performance indicators at "Alert", and 30% of the indicators in a situation considered "Critical" (table 6).

Table 6 – Analysis and validation of the hierarchy of indicators of Participation Dimension

Indicators	**Classification of Indicators of Participation Dimension**		
	Experts	**Social Actors**	**Relative Performance**
Literacy Rate	Principal	1.º	Ideal
Employment Rate of the Elderly	Principal	2.º	Critical
Compulsory Education	Supplementary	3.º	Alert
Collectivities Access	Principal	1.º	Acceptable
Cultural Facilities	Supplementary	2.º	Critical
Telecommunications Access	Supplementary	3.º	Critical
Official Website of City	Supplementary	4.º	Ideal
City Council of the Elderly	Principal	1.º	Ideal
Bank Volunteer	Supplementary	2.º	Ideal
Participation in Elections	Supplementary	3.º	Ideal

When comparing the scores given by the experts and social actors, there is an indicator that received the rating of "Principal" from experts, obtained by the social actors in the classification level of importance in decision making, mainly in the first (1), i.e. those criteria considered essential to the model were perceived as criteria capable of being of greater concern to decision makers in the formulation of public policies to the reality of older people in Trofa.

Comparing the perception of social actors and the relative performance of Trofa to the theme of education and labor participation, there was some disagreement in trials where the actors likely positioned themselves in conceptual terms.

Regarding the theme of socio-cultural participation, there is greater agreement between the real and the perception of social actors.

The theme of civic participation has all three indicators as having performed "Ideal", which probably led social actors to position themselves in conceptual terms.

Conclusions

The choice of the concept of ageing in this study, despite the various conceptualizations of human ageing, incorporates the design of active ageing adopted by WHO.

The model's premise involves the identification and selection of indicators on data published by the bodies that produce statistics for the municipalities of the Portuguese mainland, always observing the selection criteria stipulated in the methodology. Regarding selected indicators, we opted for the validation of the conceptual model, with the participation of experts from areas related to ageing theme in an urban environment. The validation of the assumption is that the collective judgment, to be well organized, is better than the opinion of a single individual.

In the decision-making process, subjectivity was always present. Failing their elimination, a solution would be to build models to support decision making, which can apprehend the subjectivity of the various actors interacting in the policy cycle. In this case, the multi-criteria analysis technique AHP was used not to eliminate the subjectivity, but to understand it, turning it into subsidies decision.

The adoption of democratic and participatory practices in the hierarchy of the indicator system was considered in this study, proposing an approach which highlighted the importance of studying the issues related to active ageing through the interaction between academia and the community, not being restricted only to the opinion and judgment of the team responsible for the research, in order to promote the theoretical and methodological debate on the legitimacy and recognition of the instrument to support the proposed decision.

The weighting for ranking of local issues by social actors organized the indicators in order of priority of these local issues, allowing for that managers can apply more efficiently the available public resources.

The validation of the results achieved in the ranking occurred by comparing the hierarchical system information and the relative performance of Trofa in comparison with all the other 77 municipalities in the Portuguese continent covered in the survey. In addition, there was a comparative analysis of the position of experts, a conceptual vision of active ageing, with the position of social actors, a local view of the reality of Trofa.

Based on these analyzes, there was a satisfactory level of consistency and correspondence between the perception of social actors on the reality of Trofa and statistical information on the prioritization of active ageing issues in urban environments, considering the representative information system hierarchical proposed.

It is believed that this system of indicators can serve as a basis for the development of decision-making to support models towards an age-friendly urban environment.

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