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Extenics-Based Study on Evaluation of Urban Community Home-care Service for the Elderly

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Abstract

This paper tries to introduce extenics theory into the evaluation of the urban community home-care service for the elderly. The paper analyzes the feasibility of using extenics to evaluate the service, uses analytic hierarchy process to decide the weight of index and constructs a comprehensive evaluation model for the service on the basis of extenics. Based on the case study of communities in Ningbo, the paper has completed the evaluation of home-care service in operation and put forward countermeasures to the existing problems.

*Keywords***:**Extenics;extenics evaluation method;quality of home-care service for the elderly

Home-care is a favorite choice for most senior citizens. With the development of home-care service, it becomes an important research subject to evaluate the service in the expectation of perfecting it. This paper introduces the extenics evaluation method into the evaluation of the home-care service in the hope that it can provide some reference for the community development and bettering the home-care service.

I. Extenics and the Feasibility of Using it to Evaluate Urban Community Home-care Service

1.1. Theoretical Foundation of Extenics and its Development

Extenics is a new discipline proposed by the famous scholar Cai Wen. It studies incompatible and contradictory problems and tries to innovate or find innovative ways to solve problems. It boasts of three

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fundamental theories, namely, base-element theory, extension set theory and extension logic. It is the first to use formalized language to describe the internal relations and solve problems. To be specific, it uses base-element to describe the subjects, extension set theory to quantify the distance in real variable function with correlation function and produces a quantitative result in the end.

1.1.1. Base-element Theory

According to the Extenics, everything in the world can be extended and the basic extension unit is base-element. The world can be categorized into three types, that is, matter, affair and relation. In order to formalize the description of them, the concepts of "matter-element" (Physical existence),, "affair-element" (events and actions) and "relation-element" are put forward and they are generally called base-elements, which is modeled as an ordered triad composed of the element name, the characteristics and its measures.

1.1.2. Extension Set Theory

Extension set describes the changability of the things in the world, that is, the description of the degree of a certain attribute in the way of a certain area in an infinite interval and using the change domain to complete the transformation between "right" and "wrong". Therefore, extension set theory can describe the transformation between right and wrong, the certain attribute of objects in certain degree, the quantitative transformation process and the qualitative change. Its emergence provides a new alternative for problem solving. It can quantify, formalize and logicalize the problem-solving process.

1.2. The Feasibility of Applying Extenics to Evaluate Urban Community Home-care Service

1.2.1 Problem-solving in Extenics can help solve the problems in evaluating community home-care service

There exist many problems in community home-care service, such as the contradiction between the subjective wishes of the elderly and the insufficiency of home-care conditions and that between the multi-polar and refined needs and careless and unsatisfactory services.

1.2.2 Construct the Service Evaluation Model with the Extenic Matter-Element Theory

Quality and quantity are two independent descriptive attributes and the extenic matter-element theory combines the two well and integrate objects, attributes and their quantity into the triad of R=(object, attribute and eigenvalue). The evaluation model for the community home-care service is based on the extenic matter-element theory, among which object refers to the home-care service, any indicator in the service quality can be regarded as the attribute and the quantity of the indicator is the eigenvalue.

1.2.3 Apply the Extenic Appraisal of Advantageous Degree to Evaluate the Home-care Service

Appraisal of Advantageous Degree is a common way to evaluate objects, strategies and methods in extenics. Its pivotal concept is to obtain a wealth of information by divergent thinking of matter-element and according to the objective limitations and different needs to solve problems, build upon the feasibility, advantages and compatibility to evaluate the matter elements got in the process of divergent thinking and finally secure those matter elements that can meet the requirements.

II. Construction of the Extenics-based Evaluation Model for the Community Home-care   Service and its Empirical Study

2.1 Determine the evaluation conditions, value range and weight

The evaluation conditions for the home-care service should be determined, marked as $SI = \{SI_1, SI_2, ..., SI_n\}$, among which $SI_i = (C_i, V_i)$ is the feature unit, C_i the evaluation feature and V_i the quantified value range of C_i , indicated as $i = (1, 2, ..., n)$.

Weight of the indicators is determined with analytic hierarchy process, and after the consistency check, the weight indicators are established. Based on the empirical studies of five communities in Ningbo, a matter-element model is constructed. The matter-element model and the data of the samples are as follows:

Table 1:the matter-element model of service evaluation, value range and weight

	First level index	Second level index	Value range	weight	Optimal value	A	B	C	D	E
service evaluation	hardware investment （0.02）	Living space per capita in community home-care service	0-43	0.02	43	4	0.4	0.2	1.2	43
	human resources investment （0.30）	The average number of employees serving every 100 senior citizens in the service	0-9	0.04	9	4	9	7	3	1
		The number of employees holding the relevant government certificate for every 100 senior citizens in the service	0-8	0.16	3	2	2	3	3	1
		The number of services offered by the volunteers to the elderly per year	0-1338	0.10	1338	250	19	33	5	1338
	Financial investment （0.25）	Financial construction fund for home-care center	0-420	0.01	420	420	240	172	360	305
		Annual government special working fund for home-care service per capita	0-3186	0.02	3186	3186	124	35	200	150
		Annual donation for home-care service per capita	0-1685	0.02	1685	1685	20	4	50	34
	Service quantity and efficiency （0.19）	The average waiting time for appraisal and approval of application	0-720	0.08	10	10	12	48	24	720
		The number of people receiving services from the working staff	0-3200	0.03	3200	3200	109	1100	18	2700
		The types of on-site services	0-10	0.03	10	6	4	5	10	6
		The number of people receiving on-site services	0-300	0.05	300	64	109	45	300	99
		The duration of time of on-site service	0-64	0.05	64	64	2	2	1	1
	Service quality （0.39）	Degree of satisfaction	0-100	0.12	98	95	98	96	98	95
		The annual non-complaint rate	0-100	0.12	100	100	100	100	100	99.99

		Number of annual revisits to the clients	0-350	0.09	350	16	109	66	350	99
		Satisfaction of staff toward their work	0-100	0.06	98	95	98	98	90	95

2.2 Establish correlation function $K_{i\{x\}}$

If it is ruled that the distance between x and the interval $V = \langle a,b \rangle$ is $p(x,V)$,

$p(x,V) = \left| x - \frac{a+b}{2} \right| - \frac{1}{2}(b-a)$, and $K(x) = -\frac{p(x,V)}{|V|}$. If the correlation function value of j objects Z_i

with the index SI_i is $K_i(Z_j)$, the correlation of Z_i with SI_i is

$K_i = [K_i(Z_1), K_i(Z_2),..., K_i(Z_m)], i = 1,2,...,n$.

2.3 The Calculation of Comprehensive Advantageous/Superiority Degree

$$\sum C(Z_j) = \alpha \cdot K(Z_j) = [\alpha_1, \alpha_2,...,\alpha_n][k_{1j}, k_{2j},...,k_{nj}]^T = \sum \alpha_i K_{ij}, \quad j=1,2, \ ...,\ m。$$

The respective advantageous degree of the five community home-care services calculated by the extenics model is as follows:

Table 2: evaluation results

community	A	B	C	D	E
Superiority index	0.2585	0.2443	0.2419	0.2630	0.2703
rank	3	4	5	2	1

According to the superiority index, of the five communities, the highest superiority value of 0.2703 of community E shows that it is the best in terms of community home-care service; with the value of 0.2630 and 0.2585, D and A ranks the second and the third respectively; and with the value of on;y 0.2419,the service of C is the worst.

III. The Countermeasures and Suggestions to Better the Community Home-care Service

3.1 Increase hardware investment and improve the community home-care services

The home-care service facilities abroad are relatively advanced while those in China are still not satisfactory. Socialized and specialized home-care services are not adequately supplied and the hardware facilities and service quality are far behind the actual demand. Therefore, China should learn from the experiences abroad and make full use the pivotal role of the government in the service such as rules,policy-making and supply of public products, increase the investment into hardware facilities by introducing companies into the cause in order to better the home-care facilities.

3.2 Coordinate resources and increase human resources into home-care services

Home-care service for the elderly is a systematic project, which involves such issues as the physical goodness, material well-being, interpersonal relationship and mental and psychological health of the elderly. The community itself can not meet the home-care need from all the senior citizens. Many foreign countries have been inviting the society to get involved, such as the government, nonprofit organizations, enterprises and volunteers etc. The high involvement of the social service groups, enterprises and individuals in community development and home-care service is an indicator of advancement of community service. Therefore, the community home-care service in China should learn from abroad, coordinate all the resources, extend the social channels, and introduce the social forces into the cause.

3. 3 Extend the fund sources and increase the financial investment into home-care service

Experiences from abroad have proved that all social forces are needed in order to solve the fund problem and improve community home-care services. Policies should be made to encourage enterprises and individuals to sponsor home-care services by donating either capital or goods. Communities can guide the elderly to serve themselves, to participate in the industries for the old by providing products or services to the society to get payoff financially.

3.4 Supply a rich variety of home-care services and make the elderly more satisfied with home-care services

Communities should try to better and enrich the services. They should provide more specialized services in order to satisfy the high-level needs other than care in life, such as mental care, psychological consultation, emotional support etc. In the meantime, the individual needs of each person should be taken into consideration, so service systems should be established and in the end the service quality is enhanced.

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