

# Study on the Performance Evaluation of Integrated Health Care Projects from a Sustainability Perspective

## -- Based on Prospect Value

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### Abstract

A performance evaluation method based on prospect value is proposed to solve the sustainable development problem of the project. This method is based on the ultimate goal of the project: to maximize the utilization of resources and meet the needs of consumers. The evaluation index system is established by combining the two core points of "medical care" and "maintenance". For the first application of prospect theory in the field of performance evaluation, draw lessons from the basic principle of value function and weight function, each index compared with policymakers expect reference point build profit (loss) matrix, calculated the size of the comprehensive value outlook and sorting the final result, the three cities in jiangsu province as an example for the empirical analysis, The feasibility and effectiveness of the method are verified.

### Keywords

Prospect Theory; Health Care Integration; Performance Assessment.

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### 1. Introduction

According to the National Bureau of Statistics, the 2019 national census shows that there are 176.03 million people over the age of 65 in China, accounting for 12.5% of the total population. By 2025, China's population aged 65 and above will account for 14.3% of the total, according to a forecast by relevant authorities. It could reach 26% by 2050. Accelerating the development of old-age undertakings and industries has become an urgent problem to be solved in China. Correspondingly, the risk of diseases in the elderly also increases, mainly chronic diseases. As chronic diseases are mainly treated with rehabilitation, the existing medical and health services and the corresponding service system can not meet the needs of the elderly. Therefore, several Opinions on Accelerating the Development of the Elderly service industry issued by The State Council clearly put forward the construction and active promotion of the service model combining medical and health care with the elderly service. As the practice of the combination of medical and nursing care in China has just started and is still in its initial stage, the existing combination of medical and nursing care projects have many problems, such as few institutions, uneven distribution of resources, inadequate planning, lack of professional talents, etc., so it is necessary to carry out performance evaluation on the sustainability of the project.

In view of this, this paper establishes a first-level index based on the ultimate goal of combining medical care with nursing care, that is, maximizing resource utilization of the project and meeting consumer demand. The final index system is developed by combining the two core points of "medical care" and "conservation". The idea of prospect theory is introduced into performance evaluation to

realize the effective combination of subjective and objective, and to think about its sustainability through the comprehensive prospect value of each index.

## 2. Literature Review

Currently, there are not many studies on the performance evaluation of the combination of medical care and elderly care. In the performance of related medical and elderly care services, Xiao Xiaohua and Yan Mengqi et al. constructed an evaluation index system of institutional pension vulnerability in the context of healthy aging from two dimensions of sensitivity and coping ability (2020). Cao Haiqing and Yao Cuiyou et al. used the data-driven method and the rules of THE PDCA cycle to develop evaluation indicators for elderly care services (2019). Yang Yilin constructed the index system of "combination of medical and nursing care" from four perspectives of economy, efficiency, effectiveness and fairness of pension institutions (2019). Li Xiaoyu, Zhang Wenguang et al., based on literature research and Delphi method, determined the grading evaluation index of long-term care for the elderly in medical and nursing institutions (2019). Fang Ye, Chen Qing et al established the indicators of the performance evaluation of the combination of medical care from the perspectives of life pressure and expectation of the elderly through literature research and empirical analysis (2018). To sum up, most of the current researches on the performance evaluation of the combination of medical care and nursing use literature research method and expert consultation method, while Chen Duan-ying believes that prospect theory provides ideas for performance from a new perspective. Therefore, this paper takes the sustainability of the project as a breakthrough point and completes the performance evaluation of the project from the perspective of prospect value.

Through literature review, it is found that most of the current researches on prospect theory are concentrated in the field of multi-attribute decision making, and the establishment of reference points usually adopts a variety of analytical ideas, such as the decision maker's given, the intermediate point of language set, and other alternatives. For example, Hao Jingjing, Zhu Jianjun et al. completed the influence of decision-making risk on evaluation results by constructing the objective programming model and designing the comprehensive prospect value range of the scheme (2015). Liu Yong et al. designed the positive and negative ideal target by using the prospect theory, and established an optimization model aiming at maximizing the comprehensive prospect value to complete multi-objective grey target decision-making (2013). According to the prospect theory, Zhang Xiao and Fan Zhiping took the expectation of decision-makers' attributes as reference points and calculated the gain and loss of the three form attribute values of clear number, interval number and triangular fuzzy number relative to the reference points to obtain the comprehensive prospect value to complete the scheme selection of risky mixed multi-attribute decision-making (2012).. Based on the above application of prospect theory in multi-attribute decision making, from the perspective of sustainability, this paper calculated the prospect value with the index data of medical-care integration projects in different cities as attribute samples to complete the performance evaluation.

## 3. A Performance Assessment Model for Health Care Integration Projects based on Prospect Theory

### 3.1 Assessment Indicator System Establishment

Indicators play an important role in all evaluation activities. In the process of constructing the performance evaluation index system of medical and nursing integrated projects, the principles of scientificness, rationality, comprehensiveness, objectivity and the combination of qualitative and quantitative should always be followed. Therefore, on the basis of reading a large number of relevant literature, this paper establishes a performance evaluation index system from the perspective of combining medical care with project sustainability. Based on the ultimate goal of project sustainability, the first-level indicators are established, that is, maximizing the utilization of medical and nursing resources and meeting the service needs of consumers; The second-level index divides resource utilization into medical resource U1 and old-age care resource U2, and service demand into

medical demand U3 and old-age care demand U4 according to the idea of "combination of medical and old-age care". Level 3 indicators based on level 2 indicators, related medical indicators and pension indicators are expanded (C1~C29). The specific evaluation indicator system is shown in Table 1.

**Table 1.** Indicators for assessing the performance of health care integration from a sustainability perspective

| First-level indicators | Second-level indicators       | Third-level indicators                      |
|------------------------|-------------------------------|---|
| Resource Utilisation   | Medical Resource<br>U1        | Number of full-time doctors C1              |
|                        |                               | Number of rehabilitation nursing staff C2   |
|                        |                               | Number of sports therapy equipment C3       |
|                        |                               | Number of physical therapy equipment C4     |
|                        |                               | Number of occupational therapy equipment C5 |
|                        |                               | Number of emergency equipment C6            |
|                        |                               | Number of other medical equipment C7        |
|                        | Conservation resource U2      | Number of nursing staff C8                  |
|                        |                               | Number of elderly service personnel C9      |
|                        |                               | Number of open beds C10                     |
|                        |                               | Number of barrier-free facilities C11       |
|                        |                               | Number of fire-fighting equipment C12       |
|                        |                               | Noise reduction material number C13         |
|                        |                               | The number of greening facilities is C14    |
| Service demand         | Medical needs<br>U3           | Institutional occupancy rate C15            |
|                        |                               | Demand for professional care workers C16    |
|                        |                               | Medication nursing accuracy C17             |
|                        |                               | Daily health monitoring completion rate C18 |
|                        |                               | Medical equipment completeness rate C19     |
|                        |                               | Emergency handling rate C20                 |
|                        |                               | Types of medical services provided C21      |
|                        | Maintenance requirement<br>U4 | Incapacitated nursing C22                   |
|                        |                               | Semi-incapacitated nursing C23              |
|                        |                               | Daily life nursing C24                      |
|                        |                               | Nursing staff practice standard rate C25    |
|                        |                               | Appliance safety rate C26                   |
|                        |                               | Accessibility rate C27                      |
|                        |                               | Environmental noise standard rate C28       |
|                        |                               | Daylighting satisfaction C29                |

### 3.2 Steps of Sustainability Performance Evaluation of Medical Care Integration Project based on Prospect Theory

Prospect theory provides a judgment basis for decision-making in uncertain scenarios, and can judge its gains or losses by comparing attribute values with reference points, which has been widely applied in multi-attribute decision-making of enterprise projects at present. In the calculation process, the entropy weight method is used to determine the weight. In the case of known weight, the performance evaluation results of medical care integration projects from the perspective of prospect value are analyzed. This paper takes the sustainability of the project as the starting point, sets the reference point as the expected reference point, and obtains the profit value and loss value by comparing the utility value and the reference value.

Step1: calculate the gain value and loss value of each evaluation index relative to the expected reference point;

Step2: Gain matrix and loss matrix;

Step3: Obtain the comprehensive foreground matrix;

Step4: Attribute weight is determined by entropy weight method;

Step5: through formula  $\sum_{i=1}^n \pi(p_i)v(x_i)$  comprehensive prospect value;

Step6: sort schemes.

## 4. The Empirical Analysis

This paper takes S1, S2 and S3, three cities in Jiangsu Province, as examples, selects one of the most representative nursing and medical institutions in each city, and conducts the performance evaluation of the project. The index data of medical resource U1 and conservation resource U2 of the secondary index were obtained through interviews. The relevant data of medical demand U3 and maintenance demand U4 were obtained through questionnaire survey. The expected value of the three-level index is taken as the reference point, and the evaluation result is judged by the comprehensive prospect value of the relative reference points of the three cities. The calculation process of the method presented in this paper is briefly described below.

1) Through investigation and statistics, relevant data of sustainability indicators of the project are obtained. Among them, the expected value parameter is based on the data of the medical and nursing institutions in Haidian District, Beijing, which has a good operation of the medical and nursing programs in China.

2) The entropy value  $e_j$ , difference degree  $g_j$  and weight  $w_j$  of 29 indicators were calculated based on the entropy weight method.

3) The expected value is regarded as the reference point to calculate the gain and loss of each index value of the three cities, establish the risk-return (loss) matrix, calculate the corresponding value function and decision weight through the formula of prospect theory, and get the prospect value of the corresponding index of each city.

4) Add the prospect values of 29 indicators in the three cities and retain four significant digits to obtain the comprehensive prospect values as shown in Table 2.

**Table 2.** Combined outlook by city

| City | Combined prospect value V |
|------|---------------------------|
| S1   | -316.2227                 |
| S2   | -95.9418                  |
| S3   | -208.9408                 |

From the calculation results, it can be seen from the calculation results that the order of prospect value of the three cities in the trial phase is  $S2 > S3 > S1$ . In other words, S2 has the highest prospect value and the best performance assessment result. The empirical analysis shows that it is easy to calculate and realize the performance evaluation of the sustainability of the project from the perspective of prospect value.

## 5. Conclusion

With the continuous advancement of the project of combining medical care with nursing care, it has become the future development trend for nursing institutions to adopt the mode of combining medical care with nursing care. The performance evaluation of the project is helpful to find the problems in the development, improve the service quality and service satisfaction of the nursing home, and realize the sustainability of the project. In view of this, this paper formulated 29 sustainability evaluation indicators from the two aspects of the ultimate goal of the project, namely, maximizing the utilization of resources and meeting the needs of consumers, combined with the two perspectives of medical care and conservation. The entropy weight method is used to determine the weight, and the function weight is obtained by combining the algorithm of prospect theory. The value function is obtained by the set expected reference point, and the comprehensive prospect value is finally calculated. The evaluation results are obtained by comparing the size of comprehensive prospect values. It provides a decision - making scheme for the performance evaluation of the project.

Considering the limitation of data collection, there are some shortcomings in the evaluation index establishment system. If the indicators are not comprehensive enough, the indicators need to be streamlined and improved in order to further improve the efficiency of the project. The future research direction is to improve the quality of the project.

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