Analysis and Evaluation on Resource Allocation of Senior Citizen Education Based on DEA-Tobit Model

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Abstract

As the number of senior citizens is increasing, population ageing has become an outstanding issue in China. The rapid growth of senior citizens causes a series of problems in senior citizen education and impacts social and economic transformation as well as modernization construction. Therefore, proving senior citizens with education has become one of the major tasks in contemporary China. Based on the above analysis, this paper evaluates the technical effect on input and output of senior citizen education resource in 31 provinces and cities and proposes measures to improve the status quo of allocating resource for senior citizen education.

Keywords: Resource allocation, Senior citizen education, Status quo, Evaluation, Analysis.

1. BACKGROUND OF THE STUDY

1.1 Literature review

The increasing acute population ageing issue makes the senior citizen education a social concern, an important part of national education system and the last cycle of the lifelong education (Lv, 2015). In this process, the lifelong education system was constantly improved, and the senior citizen education received great success, thus, it could satisfy and enrich the cultural life of the senior citizen as well as improve his/her living standard (Hu and Song, 2016). China has transformed into an ageing society, hence, it attaches great importance to senior citizen education. It selected the experience suitable for China’s actual condition to develop the senior citizen education by borrowing experience from developed countries like the United States and Japan, thus dispelling bias on senior citizen education from the awareness and concept. Furthermore, it should pay special attention to exploit human resource of senior citizen, expand the openness of higher education and further enrich the content of senior citizen education (Xu and Peng, 2016). Meanwhile, as one of the form of adult education, senior citizen education has become the trend of the contemporary era, and its majors refer to politics, sociology, economics, living, medicine and other fields (Zhang, 2016). However, the senior citizen education still has many problems in the process of its consistent development: misunderstanding from the society and the educational object-senior citizens as special group facing with many difficulties. Therefore, deficiencies exist in the educational quality, teaching mechanism and teaching resource (Yang, 2015). Based on the above analysis, China proposed measures to develop the senior citizen education by borrowing the experience from Germany, the European country with the highest level of population ageing (Yu, 2017).

1.2 Purpose of the study

As China’s economy grows, more and more stress is laid on the senior citizen education. Thus, this paper studies the resource allocation of senior citizen education based on DEA-Tobit model. On the one hand, it explores scientific measures solving problems in the senior citizen education in order to advance its development (Zhang, 2017). It is found that building management system for senior citizen education is conductive to solving the managing problem. To develop the senior citizen education, China has put forward that government and social group like philanthropic organizations should contribute together to the education by integrating advanced experience from other countries with the actual condition in China (Jiang, 2017). On the other hand, this study can provide new idea to promote the senior citizen education. At present, similarity exists in problems and the plight of senior citizen education in most areas in China (Wang, 2017). Therefore, this paper studies the resource allocation of senior citizen education from a brand-new perspective (Pan, 2017).
2. THE RESOURCE ALLOCATION OF SENIOR CITIZEN EDUCATION

2.1 The only provider of senior citizen education

The primary way to implement the senior citizen education in China is to set up senior citizen schools at all levels, of which the dominant provider is the government (Pan, 2017). For instance, the municipal senior-citizen school was sponsored and built by the government while that of the village was undertaken by the village committee. Accordingly, those were all public-interest schools, which were primarily organized by the government. However, there was no unitary criterion for them. In addition, senior citizens had no right to choose the educational activity that was mainly provided by the government. Thus, few senior citizens participated in the activity in the form of public-interest lectures organized by private and public enterprises, letting alone those set up by private institutions. (Xie, 2017). Nevertheless, the government, private training institutions and non-profit organization can all serve as providers for senior citizen education in developed western countries. By comparison, it was found that no senior citizen school was organized by profitable institutions in China, thus, there was no private training institution, charity organization and vocational school for senior citizen. Based on the above analysis, resource allocation of senior education in China is particularly unbalanced, which means the senior citizen has few choices for the education mode.

2.2 Deficient in educational content

The main content of senior citizen education is to provide articles and service through educational institutions. At present, the educational content in China is mainly in form of learning and professional skill improvement (Hu, 2017). Lessons of senior citizen universities in residential community confined to healthcare, law and current affair, etc., which is tedious and not enough to satisfy the diverse demand of senior citizen. 70% of senior citizens attending classes said that lessons in universities weren’t diverse and the form of the education is also tedious. Furthermore, those in village, town and residential community had low frequency in delivering classes. Most of them weren’t able to have lessons every day while some even only have several lessons in a month, and the frequency was not regulated. The fact suggested that it was hard to ensure the number of classes, thus revealing the unfair allocation of educational resource.

2.3 Deficient in investment on senior citizen education

In recent years, the senior citizen education developed rapidly, and its expenditure mainly came from fiscal allotment (Yang, 2017). The number of senior citizens requiring education kept growing, and the education quality was improving, thus causing an increasing shortage of capital for senior citizen education. According to the statistical data of department concerned, most of the expenditure came from fiscal allotment, and only a small part was from donation. As the fiscal allotment has many personal factors, and was hard to distribute in time, it failed to meet all the spending of the senior citizen university. The expenditure on village senior-citizen school was even scarce. The local economy always constrained the expenditure in most areas, which made it only be able to satisfy the daily expense of the university, thus, no extra fund was invested into the educational content (Lu and Chen, 2017).

3. THE EVALUATION MODEL FOR RESOURCE ALLOCATION OF SENIOR-CITIZEN EDUCATION

As DEA is an analysis model enabling nondimensionalizing analysis, managing multiple input and output indexes and evaluating several decision-making units (DMU), this paper chose it to evaluate the gross technical efficiency, net technical efficiency and economies of scale of senior citizen education in 31 provinces and cities. Besides, a multivariate analysis method should be applied in order to comprehensively depict the education resource allocation in provinces and cities, so the Tobit model was also used for further analysis of the resource. Meanwhile, an evaluation system was set up to assess the resource efficiency in senior citizen education. An evaluation system of input-output index for the senior citizen education was established via combining the above-mentioned model and the feasibility of DMU after screening data (Table 1).

Table 1 Input-output Evaluation Model of Resource Allocation for Senior-citizen Resource
<table>
<thead>
<tr>
<th>Input index</th>
<th>Second-level index</th>
<th>Third-level index</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manpower input</td>
<td></td>
<td>Staff specialist</td>
</tr>
<tr>
<td>Capital input</td>
<td></td>
<td>Staff with high academic qualification</td>
</tr>
<tr>
<td>Educational capital input</td>
<td></td>
<td>Staff with professional title</td>
</tr>
<tr>
<td>Material input</td>
<td></td>
<td>Educational capital input</td>
</tr>
<tr>
<td>School size</td>
<td></td>
<td>Fixed asset</td>
</tr>
<tr>
<td>The number of computer</td>
<td></td>
<td>the number of graduates</td>
</tr>
</tbody>
</table>


**4. HE EMPIRICAL ANALYSIS ON RESOURCE ALLOCATION EFFICIENCY OF SENIOR CITIZEN EDUCATION**

This section analyzed the research on the input and output of senior-citizen education resource. The research chose the input and output of education corporations in 31 provinces and cities (2014-2016) as raw data. The DEAP application was applied to gain results of DEA model, the specific process was shown as follows:

\[
\max h_0 = \frac{u^TY_0}{v^TX_0}
\]

\[
s.t. \quad h_j = \frac{u^TY_j}{v^TX_j} \leq 1, j = 1, 2, ..., n
\]

\[
v \geq 0, u \geq 0
\]

(1)

It can also be transformed into an equivalent linear programing:

\[
s.t. \quad h_j = \frac{u^TY_j}{v^TX_j} \leq 1, j = 1, 2, ..., n
\]

\[
v \geq 0, u \geq 0
\]

\[
s.t. \sum_{j=1}^{n} X_j \lambda_j + s^- = \theta X_0, j = 1, 2, ..., n
\]

(2)

Therefore, the technical efficiency value could be obtained to analyze whether waste existed in the input of senior citizen education. The result showed of education resource allocation in 31 provinces and cities, the gross technical efficiency is relatively high in 2014 - 2016. In 2014, the technical efficiency of senior citizen education resource allocation is 0.849. 4 provinces have DMU with 1 as their technical efficiency of resource allocation, indicating efficient technical allocation, optimal technique scale and the best input element combination. Hence, it had received a good result. In 2015, the average technical efficiency is 0.861. 7 provinces had 1 as their technical efficiency. However, the average efficiency reduced to 0.849 in 2016, and the provinces with efficiency as 1 decreased to 5. Only 3 provinces could realize both efficient technique and scale in the constant three years (Table 2).

**Table 2 DEA Numerical Distribution on 2014-2016 Resource Allocation of Senior-citizen Education**

<table>
<thead>
<tr>
<th></th>
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</tr>
</thead>
<tbody>
<tr>
<td>θ=1</td>
<td>4</td>
<td>12.90%</td>
<td>7</td>
<td>22.58%</td>
<td>5</td>
<td>16.13%</td>
</tr>
<tr>
<td>0.8≤θ≤1</td>
<td>16</td>
<td>51.61%</td>
<td>11</td>
<td>35.48%</td>
<td>12</td>
<td>38.71%</td>
</tr>
<tr>
<td>0.6≤θ&lt;0.8</td>
<td>10</td>
<td>32.26%</td>
<td>10</td>
<td>32.26%</td>
<td>11</td>
<td>35.48%</td>
</tr>
</tbody>
</table>
5. MEASURES TO IMPROVE SENIOR CITIZEN EDUCATION

5.1 Making policy to promote its development

To promote the development of senior citizen education, the provider has to be diversified, and the business entity should be encouraged to participate in the construction of senior citizen education. Policies on the senior citizen education should be made relying on its specific function and role and adhering to the principle of fairness, integrity, openness and transparency. Meanwhile, the decision-making mechanism should be established and improved, thus managing the senior citizen education efficiently and enabling its sound development. In addition, law-based construction should be facilitated proactively. It had better borrow successful experience from abroad to ensure the legislative principle of “learner first”, the legislative purpose to be ensuring the learning right, thus making the learning content practical and learning forms diverse.

5.2 Enriching the class content to satisfy diverse demands

As one of the major problems facing with senior citizen education, unitary class content is far from satisfying the diverse demand of senior citizen. Thus, innovations and new design should be made in diversifying the class content. In specific, the design of the class should be based on a better understanding of senior citizen’s demand so that the class content can be adjusted in time, and the sort and time of class will be increased. Besides, it is important to recruit new teachers to enlarge the teaching team. It is recommended to recruit teachers in local primary school, high school, universities and college, thus establishing teacher resource pool for senior citizen education. Additionally, the municipal senior citizen university should aid those in villages and towns to build basic management framework and subsidize them in order to bring their education work into normality.

5.3 Fully utilizing social education resource

As the limited investment on senior citizen education constrained its development, the social education resource should be fully utilized. It was recommended to make full use of the local education resources like libraries, museums and university classrooms for holding activities. With the help of local universities, the resource sharing between senior citizen education and social education would make it possible for avoiding the repetitive input in hardware and teaching resource. In this process, it is conductive for senior citizens to constantly gain knowledge, and learn in various teaching spot as well as learn in entertainment. Meanwhile, as the constant development of technology, distance teaching should be applied in senior citizen teaching to break the limit on time and space. The experience of Open University in UK and the Senior Citizen Network School should be borrowed to adapt the distance teaching for senior citizens, which made it easier for them to be educated. Except for that, as an important part of social education resource, senior citizens themselves ought to be exploited. As long as the citizen is qualified enough to be a teacher or a manager, they can participate in the daily teaching and management.

6. CONCLUSION

Under the circumstance of population ageing, it is important to utilize social education resource to provocatively develop senior citizen education which is obviously in public interest. Therefore, the government sector should realize resource sharing to promote its development. Consequently, this paper firstly analyzed problems existing in resource allocation of senior citizen education based on the status quo of population ageing and senior citizen education. Then, it establishes an evaluation model for resource allocation of senior citizen education based on DEA-Tobit model, and proposes measures to improve the unbalanced resource allocation. Thus, it will provide theoretical basis to improve the senior citizen education.

REFERENCES

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