Youth Sports Club Management Mechanism and Operation Mode Development

Lin Yan*

China Institute of Physical Education, Changchun Normal University, Changchun 130032, Jilin, China

Abstract: Youth sports club is a main place that contemporary youth to take sports fitness exercises and complete sports activities, due to clubs offer to sports enthusiasts and are convenient to exchange sports experiences, are popular among youth. Therefore, further develop and perfect youth sports club has become one of important tasks in current stage youth physical education. The paper starts from introducing youth clubs’ personnel structure and its appropriation expenditure situation, and on this basis, respectively establishes youth sports club management mechanism and operation mode optimal solution mode, as well as youth sports club organization events maximum model, researches on youth sports club development and further puts forward that at present youth club faculty level is general, professional athletes are relative fewer, sports device purchasing is its main appropriation expenditure. Result shows that hold training class, take basketball, football, badminton, swimming and martial arts sports events as main training contents, innovate management mechanism into director system management that can attract more youth to participate in sports club fitness, and propel to youth sports club development.

Keywords: Management mechanism, operation mode, physical health, sports club.

1. INTRODUCTION

As one of youth sports activity places main choices, youth sports club has increasingly conducted reform accompanying with youth sports development. From management system, operation way, to professional staff cultivation, talents selection, its development always has an impact on youth sports development [1].

In the article “Integration of ‘Family, school, society’ drives sunshine sports long-term mechanism research”, Li Chen-Li went deeper into analysis of sunshine sports important impacts on youth growth from family, school and society these three perspectives [2]. The thesis based on sunshine sports application, from three aspects, by investigating family, school, and society satisfaction with it, collected three kinds of groups physical exercises situation, analyzed sunshine sports running modes [3]. The thesis pointed out that sunshine sports was a kind of public sports that suitable to different age groups and different groups of people, it not only could enhance physical quality, but also could foster sports consciousness, stimulate sports enthusiasm, and then drive national people to take physical exercises [4].

In the article “Jiangxi province youth sports club development status analysis and countermeasures research”, Liu Xiang-Dong took Jiangxi province as an example, Specific researched the province youth sports clubs’ development situation.

The thesis carried out data analysis through statistics of Jiangxi province all sized youth sports clubs found problems and put forward corresponding solutions [4]. The thesis pointed out Jiangxi province youth sports clubs’ management and operation hadn’t yet so perfected, government supporting strength was not enough, therefore to promote its further development, it should increase government support, positive reform systems and perfect management [5].

In the article “Chinese youth sports club operation mode research”, Lu Zuo-Sheng took researches on youth club operational modes as entry point to carry on deepen analysis [6]. The thesis combined with Chinese youth sports clubs development history, found problems and for the problems, it started from Chinese national conditions to research. The thesis pointed out that China was a country of large population, in youth sports club operation process, it should fully considered youth, parents and society satisfaction, improve government supports, strengthen management, and then implement youth sports club operation mode that suitable to Chinese national conditions [7].

The paper starts from youth sports club management mechanism and operation mode, analyzes their development situation, including institution personnel composition, institution operation way, management mechanism and so on, and then on the basis of reduction appropriation expenditure to maximum degree, finds out most suitable Chinese youth sports clubs development management mechanism and operation way, improves youth sports clubs development situation and promotes its further development.

2. YOUTH SPORTS CLUB BASIC INFORMATION

In youth spare time domination, sports activity occupies very large proportion. China provides many places for the youth so as to encourage youth to take physical exercises,
By above analysis, it is clear that there are 77.8% youth select to proceed with sports activities in school sports club, besides there are parts of people select community sports fitness spot and public stadium. It indicates sports club is fitness place of most of youth, is concentration place of youth sports enthusiasts, therefore Chinese government should vigorously manage and operate sports clubs.

### 2.1. Youth Sports Club Faculty Team

In youth sports club, its faculty strength is a main factor that affects club level, and meanwhile is also the key to affect youth satisfaction and their sports enthusiasm stimulation. Below Table 2 and Fig. (2) are Chinese youth sports club faculty team situation. Make analysis of the data.

By above analysis, it can get conclusion that Chinese youth sports club faculty team level is relative lower, only 10.1% professional athletes here, others are physical education teachers, sports social instructors over three grades and coach, the personnel composition hasn’t yet perfected.

### 2.2. Youth Sports Club Appropriation Expenditure

In order to strengthen Chinese youth sports club management, research its management mechanism and operational way, now analyze its appropriation expenditure, and then take it as condition to further analyze youth sports club development mode. Below Table 3 is youth sports club main appropriation expenditure situation.

Above statistical Fig. (3) indicates that among youth sports club appropriation expenditure, most of them is used to purchase sports equipment, besides there are parts to be used to participate in race, and others all are used to management staff service fee, the coach service fee, publicity expenses and so on. Therefore, purchasing sports equipment is the key to youth sports club.

### 3. OPTIMAL SOLUTION MODEL-BASED YOUTH SPORTS CLUB MANAGEMENT SYSTEM RESEARCH

Youth sports club is one of main places that youth take sports activities, its management mechanism also restrict its development to a certain degree. By far, it mainly has director responsibility system, board responsibility system.

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**Table 1. Youth sports activity participation way.**

<table>
<thead>
<tr>
<th></th>
<th>Percentage%</th>
<th>Rank</th>
<th>No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>School sports club</td>
<td>77.8%</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Community fitness spot</td>
<td>4.3%</td>
<td>4</td>
<td>2</td>
</tr>
<tr>
<td>Park</td>
<td>6.0%</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Public stadium</td>
<td>4.3%</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Operational fitness site</td>
<td>5.1%</td>
<td>3</td>
<td>5</td>
</tr>
<tr>
<td>Residence</td>
<td>0.9%</td>
<td>6</td>
<td>6</td>
</tr>
<tr>
<td>Surrounding residence</td>
<td>1.6%</td>
<td>5</td>
<td>7</td>
</tr>
</tbody>
</table>

**Table 2. Youth sports club faculty situation.**

<table>
<thead>
<tr>
<th></th>
<th>Physical Education Teacher</th>
<th>Sports Social Instructors Over Three Grade</th>
<th>Coach</th>
<th>Professional Athletes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Percentage%</td>
<td>42.1%</td>
<td>26.5%</td>
<td>21.3%</td>
<td>10.1%</td>
</tr>
<tr>
<td>Rank</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
</tbody>
</table>

Fig. (1). Youth participation in sports activities.

below Table 1 and Fig. (1) are Chinese youth sports activity places selection in spare time, and analyze them.

Fig. (2). Youth sports club faculty team situation.
Youth Sports Club Management Mechanism and Operation Mode

Table 3. Youth sports club main appropriation expenditure.

<table>
<thead>
<tr>
<th></th>
<th>Cost of Equipment Purchasing</th>
<th>Management Staff Service Fee</th>
<th>Publicity Expenses</th>
<th>Race Fee</th>
<th>The Coach Services Fee</th>
<th>Other Expenses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Percentage%</td>
<td>32.4%</td>
<td>6.2%</td>
<td>9.5%</td>
<td>28.4%</td>
<td>10.6%</td>
<td>12.9%</td>
</tr>
</tbody>
</table>

Fig. (2). Youth sports club teaching situation.

Table 4. Youth sports club management mechanism.

<table>
<thead>
<tr>
<th></th>
<th>Director Responsibility System</th>
<th>Board Responsibility System</th>
<th>General Manager Responsibility System</th>
</tr>
</thead>
<tbody>
<tr>
<td>Percentage%</td>
<td>83.1%</td>
<td>13.8%</td>
<td>3.1%</td>
</tr>
<tr>
<td>Rank</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
</tbody>
</table>

and general manager responsibility system the three kinds, below Table 4 is Chinese youth sports club management system statistical data.

To research suitable youth sports club operation optimal management mechanism on the premise that its expenses are the least, now it utilizes goal programming method to solve optimal solution.

3.1. Goal Programming Guiding Thought

Goal programming objective function is composed of defined corresponding priority factors according to various objective constraints positive and negative deviation values. Its common basic form is

(1) Try to make positive and negative deviation small, and then further just arrive at goal value:

\[ \min z = f(d^+ + d^-) \]

Try to make positive deviation small, no need to arrive at goal value

\[ \min z = f(d^+) \]

Try to make negative deviation small, surpass goal value and surpass quantity is not limited

\[ \min z = f(d^-) \]

Priority factor: \( P_1, P_2, \ldots, \) and it has \( P_k \gg P_{k+1}, k = 1, 2, \ldots, q \), which represents \( P_k \) has bigger priority than \( P_{k+1} \).

Goal programming normal mathematical model is:

\[ \min z = \sum_{k=1}^{q} \sum_{j=1}^{n} \omega_k \psi_j d^+_j + \omega^\prime \psi_j d^-_j \]
3.2. Goal Programming Data Processing

According to above goal programming guiding thought, carry on data processing with Table 4 data, it adopts sequential algorithm here. Its main process is as following:

For \( k = 1,2,\ldots, q \), it solves

\[
\begin{align*}
\min z &= \sum_{j=1}^{n} P_j \left( \sum_{i=1}^{m} \omega_i x_j \right) \\
\sum_{j=1}^{n} a_{j} x_{j} &\leq (\leq) b_{i}, i = 1,\ldots, m \\
\sum_{j=1}^{n} c_{j} x_{j} + d_{j} - d_{j} &= g_{i}, i = 1,\ldots, l \\
x_{j} &\geq 0, j = 1,2,\ldots, n \\
d_{j}, d_{j} &\geq 0, i = 1,2,\ldots, l \\
\end{align*}
\]

Among them, optimal value is \( z^* \).

At first, most important is appropriation expenditure, therefore its priority lists the first grade \( P_1 \); secondly, number of youth participants is the second grade \( P_2 \); finally, youth satisfaction is the third grade \( P_3 \). It is required appropriation expenditure to be less than 30%. Therefore, it gets corresponding goal programming model:

\[
\begin{align*}
\min z &= P_1 d_{1}^{-} + P_2 (d_{2}^{-} + d_{2}^{-}) + P_3 (3d_{3}^{-} + 3d_{3}^{-} + d_{4}^{-}) \\
0.831x_1 + 0.138x_2 + 0.031x_3 &\leq 0.3 \\
x_1, x_2, \ldots, x_r, d_{j}, d_{j} &\geq 0, i = 1,2,3 \\
\end{align*}
\]

Calculate above objective function by MATLAB software, and further get goal programming optimal solution is \( z^* = (1) \), that is director management system, and appropriation expenditure is 21.2%.

3.3. Optimal Operation Mode Research

By above analysis, it can get that on the condition of least youth sports club appropriation expenditure, its most suitable development management mechanism is director management system. Therefore, to reduce its expenses, now it goes ahead with further analysis of its operational mode, and then gets optimal mode regarding youth sports club operation mode as Table 5.

At first, most important is appropriation expenditure, therefore its priority lists the first grade \( P_1 \); secondly, number of youth participants is the second grade \( P_2 \); finally, youth satisfaction is the third grade \( P_3 \). It is required appropriation expenditure to be less than 30%. Therefore, it gets corresponding goal programming model:

\[
\begin{align*}
\min z &= P_1 d_{1}^{-} + P_2 (d_{2}^{-} + d_{2}^{-}) + P_3 (3d_{3}^{-} + 3d_{3}^{-} + d_{4}^{-}) \\
0.831x_1 + 0.138x_2 + 0.031x_3 &\leq 0.3 \\
x_1, x_2, \ldots, x_r, d_{j}, d_{j} &\geq 0, i = 1,2,3,7 \\
\end{align*}
\]

Calculate above objective function by MATLAB software, and further get goal programming optimal solution is \( z^* = (1) \), that is the form of training class, and appropriation expenditure is 19.25%.

By above goal programming analysis, it is clear that on the condition that youth sports club expenses are the lowest, the management mechanism and operation mode is director management system that operates in the form of training class.

Table 5. Youth sports club operation mode.

<table>
<thead>
<tr>
<th>Percentage%</th>
<th>Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>29.1%</td>
<td>1</td>
</tr>
<tr>
<td>19.2%</td>
<td>2</td>
</tr>
<tr>
<td>18.6%</td>
<td>3</td>
</tr>
<tr>
<td>16.3%</td>
<td>4</td>
</tr>
<tr>
<td>7.0%</td>
<td>5</td>
</tr>
<tr>
<td>5.2%</td>
<td>6</td>
</tr>
<tr>
<td>4.7%</td>
<td>7</td>
</tr>
</tbody>
</table>
4. MAXIMAL PRINCIPLE-BASED YOUTH SPORTS CLUB ORGANIZED EVENTS RESEARCH

To propel to youth sports club development, only reform management mechanism and operation mode is far from enough, it should starts from the essence, analyze youth demands, organize youth favorite evens and then propel to youth sports club all-round development as Table 6.

(1) Model construction and solution

According to above question assumptions, it can get state equation of youth sports club organized events when its appropriation expenditures are permitted:

\[
\begin{align*}
\frac{dx(t)}{dt} &= -m(t) + g(t)u(t) \\
x(0) &= x_0
\end{align*}
\]

Under above state equation, it looks for optimal control strategy \( u^*(t) \) from function set \( W \) that meets \( 0 \leq u(t) \leq U \).

At first, write down question’s Hamiltonian function:

\[
H = px(t) - u(t)e^{-\delta t} - \dot{\lambda}(m(t) + g(t)m(t))
\]

Then by co-state equation and boundary condition, it solves \( \dot{\lambda}(t) \), that is by

\[
\begin{align*}
\frac{d\lambda(t)}{dt} &= -H_x = -pe^{-\delta t} \\
\lambda(t_f) &= \varphi(x(t_f)) = e^{-\delta t_f}
\end{align*}
\]

It solves:

\[
\lambda(t) = (1 - \frac{P}{\delta})e^{-\delta t} + \frac{P}{\delta}e^{-\delta t_f}
\]

In the following, utilize maximal principal to solve \( u^*(t) \).

For:

\[
H = px(t)e^{-\delta t} - \lambda m(t) + [\lambda g(t) - e^{-\delta t}]u(t)
\]

Obviously, \( H \) is linear function of \( u \), therefore it can get:

\[
u^*(t) = \begin{cases} 
U, & \lambda g(t) - e^{-\delta t} > 0 \\
0, & \lambda g(t) - e^{-\delta t} < 0
\end{cases}
\]

Or

\[
u^*(t) = \begin{cases} 
U, & [(1 - \frac{P}{\delta})e^{-\delta t} + \frac{P}{\delta}e^{-\delta t_f}]g(t) - e^{-\delta t} > 0 \\
0, & [(1 - \frac{P}{\delta})e^{-\delta t} + \frac{P}{\delta}e^{-\delta t_f}]g(t) - e^{-\delta t} < 0
\end{cases}
\]

For breaking point \( t_s \), it should meet:

\[
[(1 - \frac{P}{\delta})e^{-\delta t} + \frac{P}{\delta}e^{-\delta t_f}]g(t) - e^{-\delta t} = 0
\]

That

\[
\frac{P}{\delta} - (\frac{P}{\delta} - 1)e^{-\delta t_f} g(t) - 1 = 0
\]

And then it can solve \( t_s \).

In the subject, set

\[
x(0) = 0.48, U = 1, m(t) = 2, p = 0.1, \delta = 0.05, g(t) = \frac{2}{(1 + t)^{\frac{1}{2}}}
\]

Therefore it can get the formula of \( t_s \) as

\[
(1 + t_s)^{\frac{1}{2}} = 4 - 2e^{0.05(t-t_s)}.
\]

When \( t < t_s \), \( u^*(t) = U = 1 \), state equation now is

\[
\frac{dx}{dt} = -2 + \frac{2}{(1 + t)^{\frac{1}{2}}}
\]

When \( t > t_s \), \( u^*(t) = 0 \), state equation now is

\[
\frac{dx}{dt} = -2
\]

So when \( t > t_s \), it has

<table>
<thead>
<tr>
<th>Library</th>
<th>Percentage%</th>
<th>Rank</th>
<th>Percentage%</th>
<th>Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>Basketball</td>
<td>21.5%</td>
<td>1</td>
<td>Chess</td>
<td>2.5%</td>
</tr>
<tr>
<td>Football</td>
<td>21.5%</td>
<td>1</td>
<td>Tennis</td>
<td>2.5%</td>
</tr>
<tr>
<td>Badminton</td>
<td>13.9%</td>
<td>2</td>
<td>Aerobics</td>
<td>1.9%</td>
</tr>
<tr>
<td>Swimming</td>
<td>11.4%</td>
<td>3</td>
<td>Dance</td>
<td>1.3%</td>
</tr>
<tr>
<td>Martial arts</td>
<td>11.4%</td>
<td>3</td>
<td>Parachute from an aircraft</td>
<td>0.6%</td>
</tr>
<tr>
<td>Volleyball</td>
<td>6.3%</td>
<td>4</td>
<td>Rock climbing</td>
<td>0.6%</td>
</tr>
<tr>
<td>Go</td>
<td>3.8%</td>
<td>5</td>
<td>Others</td>
<td>0.6%</td>
</tr>
</tbody>
</table>
$$\int_0^t \frac{dx}{dt} = \int_0^t [-2 + \frac{2}{(1+t)^2}] dt + \int_0^t (-2) dt$$

It solves:

$$x(t) = 4(1+t)^\frac{1}{2} + 96 - 2t$$

$$t_f = 2(1+t)^\frac{1}{2} + 28$$

It gets: $t_s = 10.2$, $t_f = 23.8$

Therefore, it gets optimal control strategy that is:

$$u^*(t) = \begin{cases} 1, & 10.2 \leq t \leq 23.8 \\ 0, & 0 \leq t \leq 10.2 \end{cases}$$

By above analysis, it can get that on the condition that youth sports club appropriation expenditure allows, its most suitable events are basketball, football, badminton, swimming and martial arts. Only hold youth most favorite events then can attract more youth to participate in club sports activities, and then propel to youth sports club development, and meanwhile also improve youth personal physical quality.

CONCLUSION

Firstly, the paper starts from analyzing youth sports club basic information, researches on youth amateur sports activity way, place selection, youth sports club personnel structure and its appropriation expenditure situation, and then puts forward that youth sports club is main optional exercise place when Chinese youth takes sports activities, its faculty level is general, professional athletes are relative fewer, most of expenditures are used to purchase sports equipment. Secondly, the paper respectively establishes youth sports club management mechanism and operation mode optimal solution mode, as well as youth sports club organization events maximum model, and goes deeper analysis of management system and operation mode that is most suitable to Chinese youth sports club development on the condition of least appropriation expenditure, and puts forward youth favorite sports clubs events. And then it gets conclusion that director management system is most suitable management mechanism for youth sports club, and operation way should base on training class, and meanwhile, they should focus on holding basketball, football, badminton, swimming and martial arts sports events so as to attract more youth to participate in sports club fitness.

CONFLICT OF INTEREST

The author confirms that this article content has no conflict of interest.

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REFERENCES