Applied Mathematics and Nonlinear Sciences

<https://www.sciendo.com>

Research on the influence of fuzzy mathematics simulation model in the development of Wushu market

Hongyuan Sun¹, Wu Lv^{1†}, Adil Omar Khadidos², Radwan Kharabsheh³¹ Institute of Physical Education, Jiaozuo Normal College, Jiaozuo, Henan 454000, China² Department of Information Technology, Faculty of Computing and Information Technology, King Abdulaziz University, Jeddah, Saudi Arabia³ Applied Science University, Al Eker, Kingdom of Bahrain

Submission Info

Communicated by Juan Luis García Guirao

Received June 17th 2021

Accepted September 24th 2021

Available online December 13th 2021

Abstract

The paper adopts research methods such as literature data method, expert interview method and mathematical statistics method, and uses fuzzy mathematics theory to make a quantitative comprehensive evaluation of related data of martial arts industry. The research conclusions obtained are as follows. The shortcomings of the martial arts industry in the process of marketisation are: (1) lack of human resources; (2) local enthusiasm for investing in the martial arts industry is not high; (3) related industries and platforms that can be used are less. Suggestions to address these are: (1) improve the popularity and influence of martial arts products; (2) formulate relevant policies and regulations to guide the development direction of the martial arts industry; (3) strengthen cooperation with the media, cultivate and package high-level martial arts professionals and establish a martial arts brand image.

Keywords: Wushu industry, market-oriented development, quantitative analysis**AMS 2010 codes:** 34A34

1 Introduction

Martial arts industry is an emerging industry of sports; martial arts industry and other industries have coordinated development of the martial arts industry, as a result of which it continues to drive forward. The popularity of boxing in different regions is not the same. The martial arts industry aims to promote regional economic development, but it also provides protection for the regional advantages of the martial arts industry's industrial base. To explore the core competitiveness of the martial arts industry, in-depth analysis of regional advantages

[†]Corresponding author.Email address: kenl@163.com

of the martial arts industry is needed, for the martial arts industry has played a very important practical role in increasing the significance of the regional economy. Martial arts industry as an emerging industry of sports, martial arts industry and other industries coordinated development of the holistic martial arts industry, and thus it continued to drive forward. Popularity of boxing in different regions is not the same. Martial arts industry promotes regional economic development; also, it ensures that the regional advantages of martial arts industry's industrial base are provided protection. In this paper, we explore the core competitiveness of martial arts industry, and carry out in-depth analysis of regional advantages of the holistic martial arts industry, for the martial arts industry has played a very important practical role in increasing the significance of the regional economy [1].

Martial arts as a carrier of economic industry, collectively referred to as martial arts industry, or the so-called market-oriented martial arts industry, is the martial arts industry in the open market, and aims to market demand-oriented, competitive 'survival of the fittest' strategies as a means to achieve martial arts resources fully; and these strategies are rationally formulated to maximise efficiency mechanism goals. This study is designed based on the concept of martial arts industry and the special nature of market-oriented martial arts industry; the industry classification of the elements of martial arts—which has as its objective the sorting and analysis of martial arts industry resources—are classified according to certain categories, in order to better explore the development of ideas to promote the market-oriented martial arts industry.

2 Evaluation principles for the core competitiveness of the martial arts industry

2.1 Principle of comprehensiveness

The core competitiveness of the martial arts industry is a continuous and relative concept, and the evaluation of the core competitiveness of the martial arts industry is also a continuous process. When selecting the evaluation index for evaluating the core competitiveness of the sports industry, the selected index should be motivated not only by the need to reflect the current core competitive advantage but also by the need to consider the evaluation after the development of the sports core competitiveness in the future. The indicators involved are required to reflect all the information pertaining to core competitiveness to the greatest extent. Therefore, when selecting evaluation indicators, the selected indicators must be comprehensive and extensive, and capable of fully reflecting the constituent elements of core competitiveness; further, the selection of indicators must be comprehensive [2].

2.2 Validity principle

The evaluation system for the core competitiveness of the martial arts industry uses corresponding indicators to reflect its competitive advantages. The selected indicators should reflect most of the information about the core competitiveness. Therefore, the indicators must be representative, accurate and reliable. They should not only be suitable for the horizontal comparison of the core competitiveness of the martial arts industry between different regions but also lend themselves to longitudinal comparison of the core competitiveness of the martial arts industry in the same region to ensure the validity of the evaluation results.

2.3 Scientific principles

For the construction of the core competitiveness evaluation system of the martial arts industry, it must conform to the scientific principle. First of all, the selection process and operation process of various indicators must be scientific and conform to a certain scientific basis. Second, the information contained in various indicators must be able to scientifically reflect the information of core competitiveness. Third, the choice of evaluation methods for constructing core competitiveness must be scientific and feasible [3].

2.4 The principle of objectivity

The so-called objectivity mainly refers to the evaluation content that needs objective contemplation after the evaluation system stands established. First of all, the evaluation indicators must be objectively measured and subjective indicators should be avoided to the extent possible; second, the statistical data and data sources collected when constructing the evaluation system must be true and reliable; third, the seriousness and standardisation of evaluation methods must be emphasised.

2.5 Principle of practicality

In the evaluation index system of core competence martial arts industry, the core competitiveness of martial arts industry is currently evaluating the establishment of martial arts as a means to the ultimate goal, mainly in the evaluation system, to detect and determine the core competitiveness of martial arts industry, to further develop and improve the core competitiveness of the industry and to promote the development of martial arts industry. Therefore, the evaluation system, the establishment of evaluation results, the evaluation processes and the core competitiveness of the martial arts industry as the main direction should be strengthened to promote the development of martial arts industry. Preparation of the evaluation system must have a practical effect, in order to assess the usefulness of the evaluation model meaningfully.

2.6 The principle of combining qualitative and quantitative evaluation

In order to be able to establish a persuasive and intuitive response to the level of the core competence of the martial arts industry, quantitative evaluation is necessary. However, just stacking and listing some quantitative data cannot fully reflect the core competitiveness of the martial arts industry. Moreover, many indicators that reflect the core competitiveness of the martial arts industry are objectively difficult to quantify. Therefore, when establishing an evaluation system, it is necessary to fully consider the combination of qualitative and quantitative evaluation methods to fully ensure the integrity of the evaluation results.

3 Construction of a three-level index system for the core competitiveness of the martial arts industry

In this study, the classification of martial arts industry is the basis, and the core index constitutes the insight of a competitive martial arts industry's technology into the core competitiveness of martial arts, martial arts supply, industrial core competitiveness, martial arts talent, industrial core competitiveness, core competitive martial arts and cultural industries' power. Secondary indicators for the index are the martial arts fitness market, martial arts equipment market, tourism market in martial arts, martial arts brokers, audio books on martial arts, martial arts training market, martial arts competition performance market, martial arts clothing market, the beverage market

Fig. 1 The construction of a three-level index system for the core competitiveness of the martial arts industry.

Table 1 The core competitiveness index system of the martial arts industry

Level 1 indicator	Secondary indicator layer	Level three indicators
The core competitiveness of martial arts technology industry	Martial arts fitness market	Urban martial arts, school martial arts, rural martial arts, military martial arts
	Martial arts competition performance market	Competitions, martial arts games, traditional martial arts performances
	Martial arts training market	International and domestic martial arts training base
	Martial arts labour market	Martial arts intermediary service
The core competitiveness of martial arts supplies industry	Martial arts clothing market	National costumes, performance costumes
	Martial arts equipment market	Machinery Supplies
	Martial arts souvenirs	souvenir
	Martial arts drink market	Functional drinks
	Martial arts education market	Martial arts patents, foreign aid agencies
The core competitiveness of martial arts talent industry	High-level athlete	Clubs, packaging advertising industry
	Folk martial artist	Position management station, club
	Martial arts agent	Talent Network
The core competitiveness of martial arts culture industry	Wushu books, audio and video	Works, video, audio
	Martial arts financial insurance	Lottery, fundraising, fund
	Martial arts tourism market	Tourist attraction
	Martial arts event	Martial arts festival
	Wushu information consultation	Wushu information dissemination

in martial arts, folk martial artist, martial arts events of the labour market, high-level athletes, martial arts-related souvenirs, martial arts, science and education market, and martial arts and martial arts related information consulting. It follows that the core competitiveness index system of martial arts industry is constituted by four-level indicators, including 16 secondary indicators. In Table 1, the three indicators used represent the core competitiveness indicators of the martial arts industry. Figure 1 shows the construction of a three indicators system, in relation to a core competitiveness martial arts industry [4].

4 Evaluation model of the core competitiveness of the martial arts industry

Based on wide research data, research results in development have benefited from other, finalised research; the methods used, with the consent of recognised experts, include fuzzy comprehensive evaluation (FCE) to establish an evaluation model of core competence of martial arts industry. FCE was developed in 1965 by the American cybernetics' expert Chad; the basis being the objective needs of the development of science and technology, and the use of precise mathematical methods of fuzzy concept description. FCE is based on fuzzy math; the fuzzy relationship between the numerous border connotations is unclear and difficult to quantify with quantitative factors, which represent one method of evaluation. Fuzzy comprehensive averaging method is more suitable for level, multi-attribute, multi-index systems of comprehensive evaluation. Indicators used for core competitiveness are more numerous, and have more levels and various properties; thus, they are more suitable for evaluation through the use of FCE method. A pictorial representation of the FCE process is shown in Figure 2 [5].

Fig. 2 Process of FCE method. FCE, fuzzy comprehensive evaluation.

4.1 Constructing the core competitiveness index set of martial arts industry

There are four core competitiveness components of industries' martial arts techniques: martial arts supply industrial core competitiveness, martial arts talent core competitiveness of industries, martial arts culture industry core competitiveness index layer of the main criteria and the martial arts industry's core competitiveness of the target layer. We set $U = \{U_1, U_2, U_3, U_4\}$, U_1 = core competitiveness of martial arts technology industry, U_2 = martial arts supplies core competitiveness of industries, U_3 = martial arts core competitiveness of industry talent and U_4 = martial arts and cultural industry's core competitiveness; the layer index set of primary criteria assessment of core competitiveness of martial arts industry (U) is: $U = \{U_1, U_2, U_3, U_4\} = \{U_1 = \text{martial art core competitiveness of industries}, U_2 = \text{martial arts supplies core competitiveness of industries}, U_3 = \text{martial arts core competitiveness of industry talent}, U_4 = \text{martial arts culture industry core competitiveness}\}$.

Every four main criteria level indicator (U_1, U_2, U_3, U_4) follows the sub-index layer criteria: $U_1 = \{U_{11}, U_{12}, U_{13}, U_{14}\} = \{\text{martial fitness market}, \text{martial arts competitions performance market}, \text{martial arts training market}, \text{martial labour market}\}$; $U_2 = \{U_{21}, U_{22}, U_{23}, U_{24}, U_{25}\} = \{\text{martial apparel market}, \text{martial arts equipment market}, \text{martial souvenirs}, \text{martial beverage market}, \text{martial science market}\}$; $U_3 = \{U_{31}, U_{32}, U_{33}\} = \{\text{high-level athletes}, \text{folk martial artist}, \text{martial arts broker}\}$; $U_4 = \{U_{41}, U_{42}, U_{43}, U_{44}, U_{45}\} = \{\text{audio books martial arts}, \text{martial arts tourism market}, \text{finance and insurance martial arts}, \text{martial arts events}, \text{martial arts information}\}$.

4.2 Determine the weight of each index layer of the core competitiveness of the martial arts industry

First, we determine the influence weight of each sub-criteria level index on the main criterion level index. Let us suppose that K is the unified code of 16 sub-criteria level indicators to 4 main criterion level indicators; then, 42 sets of weights can be obtained, namely K_i ($i = 1, 2, 3, 4$), where $K_1 = [K_{11}, K_{12}, K_{13}, K_{14}]$, respectively,

represent the weight value of the martial arts fitness market, martial arts competition performance market, martial arts training market and martial arts labour market. The value is positive, and the sum of each value is 1. $K2 = [K21, K22, K23, K24, K25]$ represent the weight values of the martial arts clothing market, martial arts equipment market, martial arts souvenir market, martial arts beverage market, and martial arts science and education market. The value is positive and the sum of the values is 1. $K3 = [K31, K32, K33]$, respectively, represent the weight values of high-level athletes, folk martial artists and martial arts agents. The value is positive, and the sum of the values is 1. $K4 = [K41, K42, K43, K44, K45]$, respectively, represent the weight value of Wushu books, audio and video, Wushu tourism market, Wushu financial market, Wushu large-scale activities and Wushu information consultation. The value is positive and the sum of each value is 1. Figure 3 shows the process of calculating the weight of each indicator layer of core competitiveness.

Fig. 3 The process of calculating the weight of each indicator layer of core competitiveness.

Then, the priority is to determine the influence of each main criterion layer indicator right on target layer weight. Provided Z is a four main criteria level indicator of target layer (martial arts industry core competitiveness) having a weight that is set, $Z = [Z1, Z2, Z3, Z4]$, wherein $Z1, Z2, Z3, Z4$ represent martial art industry core competencies, core competitiveness of industries martial arts supplies, martial arts talent core competitiveness of industries and martial arts culture core competitiveness of industries affecting the right of the core competitiveness of martial arts industry's heavy components; the values are positive, and each value is 1. For each of the above main criteria level indicators (level indicators), sub-criteria layer index (secondary indexes) influence weight data obtained in this study by two experts investigating the score, and thereafter dealing with the specific relevant statistical data (Table 2).

Table 2 The weight distribution of the core competitiveness evaluation index of the martial arts industry.

First level indicator	Weights	Secondary indicators	Weights
Martial arts competition	0.75	Martial arts fitness industry	0.118
		Performance market	0.317
		Martial arts training market	0.519
		Martial arts labour market	0.046
Martial arts supplies industry competitiveness	0.023	Martial arts clothing market	0.309
		Martial arts equipment market	0.362
		Martial arts souvenirs	0.117
		Martial arts drink market	0.108
		Martial arts education market	0.104
Martial arts talent industry competitiveness	0.091	High-level athlete	0.414
		Folk martial artist	0.529
		Martial arts agent	0.057
Competitiveness of Wushu culture industry	0.171	Wushu books, audio and video	0.112
		Martial arts tourism market	0.314
		Martial arts financial insurance	0.302
		Martial arts event	0.231
		Wushu information consultation	0.041

4.3 Determine the set of comments on the core competitiveness of the martial arts industry

For the evaluation of the core competitiveness of the martial arts industry at all levels, five comment levels can be selected: good, good, fair, poor and poor. Let V be the comment set; then, $V = \{V_1, V_2, V_3, V_4, V_5\}$ (good, better, fair, poor, poor).

4.4 List the initial evaluation matrix of the core competitiveness of the martial arts industry

Suppose U_{ij} (that is, the specific indicators of the 16 sub-criteria levels) belongs to the t -th review V_t (V_t represents 5 reviews that are good, good, fair, poor and poor) as y_{ijt} , then the main criterion level U_i can be obtained. The initial fuzzy judgement matrix Y_i is as follows:

$$Y_1 = \begin{bmatrix} y_{111} & y_{112} & y_{113} & y_{114} & y_{115} \\ y_{121} & y_{122} & y_{123} & y_{124} & y_{125} \\ y_{131} & y_{132} & y_{133} & y_{134} & y_{135} \\ y_{141} & y_{142} & y_{143} & y_{144} & y_{145} \end{bmatrix} \quad (1)$$

$$Y_2 = \begin{bmatrix} y_{211} & y_{112} & y_{113} & y_{114} & y_{115} \\ y_{221} & y_{122} & y_{123} & y_{124} & y_{125} \\ y_{231} & y_{132} & y_{133} & y_{134} & y_{135} \\ y_{241} & y_{142} & y_{143} & y_{144} & y_{145} \end{bmatrix} \quad (2)$$

$$Y_3 = \begin{bmatrix} y_{311} & y_{112} & y_{113} & y_{114} & y_{115} \\ y_{321} & y_{122} & y_{123} & y_{124} & y_{125} \\ y_{331} & y_{132} & y_{133} & y_{134} & y_{135} \end{bmatrix} \quad (3)$$

$$Y_4 = \begin{bmatrix} y_{411} & y_{112} & y_{113} & y_{114} & y_{115} \\ y_{421} & y_{122} & y_{123} & y_{124} & y_{125} \\ y_{431} & y_{132} & y_{133} & y_{134} & y_{135} \\ y_{441} & y_{142} & y_{143} & y_{144} & y_{145} \end{bmatrix} \quad (4)$$

On this basis, we may suppose the fuzzy judgement set of the main criterion level index U_i to be A_i ; then:

$$A_i = KiOY1 = \{a_{i1}, a_{i2}, a_{i3}, a_{i4}, a_{i5}\} \quad (5)$$

where K_i is the influence weight of each sub-criteria level index (such as martial arts fitness industry) on the main criterion level index (such as the core competitiveness of martial arts technology industry); ‘O’ is the operator $M(, \oplus)$, $a_{it} = \sum_{j=1}^n K_{ij}Y_{ijt}$ which can calculate the core competitiveness of the martial arts technology industry. The fuzzy evaluation set consists of four main criterion-level indicators: the competitiveness of the martial arts supplies industry, the competitiveness of the martial arts talent industry and the competitiveness of the martial arts culture industry. From this, the fuzzy evaluation set of the target level (the core competitiveness of the martial arts industry) can be obtained as A, and the secondary evaluation matrix would be as follows:

$$A = \{A1, A2, A3, A4\}T = \begin{bmatrix} a_{a11} & a_{12} & a_{13} & a_{14} & a_{15} \\ a_{21} & a_{22} & a_{23} & a_{24} & a_{25} \\ a_{31} & a_{32} & a_{33} & a_{34} & a_{35} \\ a_{41} & a_{42} & a_{43} & a_{44} & a_{45} \end{bmatrix} \quad (6)$$

On the basis of Eq. (6), the final FCE mathematical model E of the core competitiveness of the martial arts industry is obtained, as follows:

$$E = ZOA = (Z1, Z2, Z3, Z4)0 \begin{bmatrix} a_{a11} & a_{12} & a_{13} & a_{14} & a_{15} \\ a_{21} & a_{22} & a_{23} & a_{24} & a_{25} \\ a_{31} & a_{32} & a_{33} & a_{34} & a_{35} \\ a_{41} & a_{42} & a_{43} & a_{44} & a_{45} \end{bmatrix} \quad (7)$$

After Eq. (7), a set of data e_t ($t = 1, 2, 3, 4, 5$) can be obtained. At this time, the sum of all e_t values is not equal to 1. After normalised data processing, a FCE of the core competitiveness of the martial arts industry can be carried out. The basis of the evaluation is based on the principle of maximum membership degree of fuzzy mathematics, that is, the comment level that the maximum e value falls in indicates the core competitiveness of the martial arts industry that is most likely to be at that level. The final calculation result of the model yields the following set of data: 0.715, 0.022, 0.089, 0.171, 0.13. According to the comment set originally set by the model, it can be considered that the core competitiveness of the martial arts industry is at the ‘good’ level. According to the analysis of the weight data, the martial arts training industry occupies the best competitive position in the martial arts technology industry. We continue to make a more comprehensive evaluation of the core competitiveness of the martial arts industry, and we can also use the relevant data in the initial judgement matrix and the secondary judgment matrix in Eqs (5) and (6) to get some more specific and practical significance for the conclusion.

5 Quantitative evaluation results of marketisation operation of martial arts industry

We use fuzzy judgement theory and methods to quantitatively evaluate and analyse the marketisation of martial arts industry. Based on the survey of 20 element quality indicators by 25 experts, a total of 20 sub-items were scored on four major items: product quality evaluation, product market evaluation, expected benefit evaluation and market development condition evaluation. Various evaluations were obtained using statistical calculation methods, and graded. According to the sum of each item obtained by the level 3 factor, the total score of the level 2 factor can be known. And we obtain the standard rate of the level 2 factor: the standard rate of the level 2 factor = the total number of scores of the level 2 factor/3 the sum of the maximum value of each score of the level factor. The standard rate of two-level factors is used to judge the marketability of the four items of product resource quality, product market, expected benefits and development conditions [6].

1. Product resource quality scored 48 points, accounting for 53%, indicating that the industrial resource quality is excellent and in a state of development. Among them, the entertainment and competitive levels are in the best state, mainly because of the lack of sports-related entertainment activities. Some people who love martial arts and use martial arts to exercise their bodies, and martial arts professionals, lack a platform; martial arts skills cannot be used; and martial arts projects cannot be promoted. Therefore, the development of martial arts industry can enable the majority of martial arts enthusiasts to achieve their goals of competition and entertainment.
2. The total product market score is 14 points, accounting for 70%, indicating that the market has great potential and is conducive to development. The potential market is huge, mainly due to the national policy calls and government support for the development of cultural industries in recent years, and the external development of the martial arts industry. The environment is now better.
3. The expected benefit score totals 16 points, accounting for 53%, indicating that the expected market benefit is optimistic, the development gains are large and the martial arts industry is a non-material industry, which can minimise environmental damage and maximise economic and social benefits.
4. The development condition score is 22 points, accounting for 31%, indicating that the existing industry development conditions are insufficient, its own foundation is weak, and the scale is small; in the martial arts industry, there is a lack of managers familiar with the two disciplines of market economy and martial arts industry management, and most of the operators have a low level of education, a narrow range of knowledge, an irrational age structure and insufficient knowledge renewal. There are fewer professionals with professional knowledge of large enterprise management and asset management. The government and related institutions need to increase development support, cultivate martial arts talents with higher comprehensive qualities and improve the industrial development mechanism to facilitate market-oriented operations. From the observations gained, it is inferred that the market-oriented development of the martial arts industry should focus on the development of the downstream industries of the martial arts industry, and the government needs to strengthen guidance and control, so as to purposefully propose countermeasures for the market-oriented development of the martial arts industry [7].

6 Research on development strategies

6.1 Improve the popularity and influence of martial arts products

According to the above evaluation, the Wushu industry development condition score is only 22 points, and the existing industry development foundation is weak and small. Therefore, the thrust towards development of the martial arts industry must first concentrate on promoting related industries in the martial arts industry, such as various martial arts equipment supplies, clubs, packaging advertising, martial arts books, pictorials, CDs, martial arts tourism spots etc., extending from upstream industries to downstream industries, through the integration of information, technology, capital and human resources between industries, which will form an industry cluster around the martial arts industry, and enhance the influence and competitiveness of the martial arts industry [8]. This can be achieved by improving the industrial chain of the martial arts industry, implementing the development strategy of 'going out and introducing', promoting representative martial arts products to other regions, especially in martial arts competitions and martial arts-related activities, and improving the quality and popularity of martial arts products. On the basis of promoting the development of martial arts-related industries, it is necessary to fully consider whether related products in the industrial framework can meet the needs of different consumer groups, and develop different martial arts consumer products or services in accordance with the differences in demand, age, income, class and occupation. The project will give priority to martial arts products that are easy to translate into market demand; it is also necessary to respect consumer feedback, improve

service awareness and quality, and create distinctive martial arts products, so as to better promote and create influence [9].

6.2 Formulate relevant policies and regulations to guide the development direction of the martial arts industry

In view of the insufficient development conditions of the existing martial arts cultural industry, insufficient government support is also a reason. For example, it is difficult to approve policies and funds related to the construction of martial arts schools, martial arts fitness clubs and the government's construction of martial arts platforms and martial arts competitions. Possibly due to the lack of awareness of the importance of the government, the government is not clear about the martial arts development policy in terms of related laws and policies. It can be seen from this that the government plays an extremely important role in improving the competitiveness of the martial arts industry [10]. The role of the government is embodied in the rationality and timeliness of policy formulation, the soundness of laws and regulations, the support to the industry and the establishment of efficient financing channels. For example, the establishment of a cultural industry financing platform, on the one hand, can establish a network platform to promote the martial arts industry; on the other hand, it can increase the construction of cultural industry infrastructure, establish martial arts-related supporting equipment in parks and other leisure places, and can also establish martial arts halls. Further, through the supervision of relevant departments, it is necessary to standardise market order, strengthen industry self-discipline mechanism and industry management system etc., to standardise the martial arts market order and correctly guide the development direction of the martial arts industry [11]. Policy support for the martial arts industry is an important guarantee for the long-term development of the martial arts industry. It can not only increase the commercial radiation of the martial arts industry to other domestic provinces from a market perspective but also enhance the spread and development of regional culture in the country.

6.3 Strengthen cooperation with the media, train and package high-level martial arts professionals and establish a martial arts brand image

1. Due to its weak foundation, small scale and limited development, the martial arts industry should choose some effective publicity channels, such as television, the Internet, and film and television. These channels can not only promote the characteristics of the martial arts industry, and enhance financing, but also promote martial arts culture and establish a brand image of martial arts. In addition, it is possible to establish martial arts fitness classes, martial arts schools and even colleges and universities with their own brand of martial arts majors, master's degrees and doctoral programs [12].
2. The age structure and educational background of the operators and practitioners in the martial arts industry are unreasonable, which also restricts the development of the martial arts industry. In this regard, training institutions should be established based on the actual situation, and the training of related talents in the martial arts industry should be strengthened, starting from the youth. In the personnel system, there is a need to form a flow mechanism and elimination mechanism, and eliminate low-quality martial arts practitioners; in terms of economic investment, decision-makers must strengthen decision-making power and management initiative, instead of subjectively making assumptions and rushing forward; in thinking about concepts, there is a need to abandon the typical lazy mentality, and strengthen market awareness, competition awareness and sense of crisis.

7 Conclusion

The martial arts industry is the product of the division of labour in modern society. As a unique cultural treasure of the Chinese nation, martial arts must be marked by traditional Chinese culture in the process of industrialisation. Under the conditions of the socialist market economy, the development of the martial arts

industry must follow the market economy. Under the imprimatur of law, it is necessary to establish a management mechanism that adapts to the market economy, build a set of competition rules and a good competitive environment that are compatible with the market economy, and guide the martial arts industry market to always develop in the correct and healthy direction with appropriate administrative intervention. The professionalisation of martial arts requires the development of related products; also, it is advisable to absorb the experience of Western sports industrialisation, and embark on the fast lane of rapid and healthy development. The evaluation of the development of the martial arts industry in this study is aimed mainly at providing a basis for the preliminary preparations for the development of the martial arts industry. The analysis shows that the martial arts industry is in a state of development, the market potential is large and the expected benefits are also very optimistic. However, the basic conditions for the development of the martial arts industry are insufficient, and it is necessary to increase support and cultivate relevant talents. It is hoped that the research in this article can serve as a reference for the future development of the martial arts industry.

References

- [1] Li, X. Taijiquan exercise development status and countermeasures research bases on the background of health. *The Open Cybernetics & Systemics Journal*. 2015. 9(1):pp. 1665-1671.
- [2] Yong, P., Bang-Ian, L., & Dai-Ping, Z. The influence of traffic distribution by route choice behavior under the condition of no inducing information based on the limited rational fuzzy game. *Journal of Highway & Transportation Research & Development*. 2017. 11(1):pp. 84-90.
- [3] Saraiva, B. T. C., Ritti-Dias, R. M., Farah, B. Q., SuetaKe, Vinícius YuKio Botelho, Diniz, T. A., & Costa Júnior, Paulo, et al. Cardiovascular effects of 16 weeks of martial arts training in adolescents. *Revista Brasileira De Medicina Do Esporte*. 2018. 24(3):pp. 212-215.
- [4] Drury, B. T., Lehman, T. P., & Rayan, G. Hand and wrist injuries in boxing and the martial arts. *Hand Clinics*. 2017. 33(1):pp. 97-106.
- [5] James, L. P., Haff, G. G., Kelly, V. G., & Beckman, E. M. Towards a determination of the physiological characteristics distinguishing successful mixed martial arts athletes: a systematic review of combat sport literature. *Sports Medicine*. 2016. 46(10):pp. 1525-1551.
- [6] MastnaK, & Wolfgang. Sports and martial arts activities for public health purposes: the musician's risk profiles and exercise-based health care as a model. *Journal of Public Health*. 2017. 25(3):pp. 231-241.
- [7] Hausegger, T., Vater, C., & Hossner, E. J. Peripheral vision in martial arts experts: the cost-dependent anchoring of gaze. *Journal of Sport & Exercise Psychology*. 2019. 41(3):pp. 1-9.
- [8] Sirisena, D., Leong, C. R., See, P., & Teoh, C. S. Popliteal artery entrapment syndrome in a singaporean mixed martial arts fighter. *Singapore medical journal*. 2018. 59(2):pp. 114-115.
- [9] Andrade, A., Silva, R. B., & Fábio Hech Dominski. Application of sport psychology to mixed martial arts: a systematic review. *Kinesiology*. 2020. 52(1):pp. 94-102.
- [10] Chen, T. Effects of martial arts on recovery of motor function and nerve excitability of stroke patients. *NeuroQuantology*. 2018. 16(6):pp. 894-898.
- [11] G. Durán-Meza, J. López-García, J. L. del Río-Correa, The self-similarity properties and multifractal analysis of DNA sequences. *Applied Mathematics and Nonlinear Sciences*. 2019. 4(1):pp. 267-278.
- [12] F. B. Benli, O. A. İlhan, Ö. Keskin, An Allee Threshold Model for a Glioblastoma (GB)-Immune System (IS) Interaction with Fuzzy Initial Values. *Applied Mathematics and Nonlinear Sciences*. 2020. 5(1):pp. 499-508.

This page is intentionally left blank