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Profitability Analysis of E-Sports Industry-A Case Study of Suzhou XingLi Network Technology Co., LTD

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Abstract. As a new industry in the Internet era, e-sports industry stood among many industries despite the outbreak of COVID-19 at the end of 2019, becoming one of the few industries not affected by the epidemic.Suzhou XingLi Network Technology Co. Ltd. is a prominent example in the e-sports industry. Profitablity analysis of XingLi is used to unerstand the operating model and provide reasonable advices. Factor analysis and trend analysis are used, through the analysis of the change trend combined with the industry related situation and market policy, the promotion strategy suitable for electronic sports club is given.

Keywords: E-Sports Club; Profit Model; Factor Analysis; Trend Analysis.

1. Introduction

With the development of E-Sports industry, the industry chain has expanded rapidly. In 2021, the general income of E-Sports industry had got $ 1.1-billion around the world. Total views of E-Sports approached 474-millon dollar. The expected income of E-Sports in 2024 will reach $ 1.6-billion. However, the outbreak of COVID-19 at the end of 2019 caused the economic dislocation, the E-Sport industry in China still developed well, and the general income exceeded $ 350-million. E-Sports club is the backbone force in the whole E-Sports industry ecology [1-3]. E-Sports club is the basic and the most important part. A lot of players are trained, and some of them turn to professional players. Moreover, E-sports anchors and commentary are also trained by club. It is the platform that connects not only game development studio, event federation, live-broadcasting platform, but also entertainment venue and so on.

E-Sports is an emerging industry, and the development epochs is short, the core competitiveness of E-Sports is consumer preference in the market. The management of E-Sports lacks of organization, and the specific laws and regulations for E-Sports are faultiness. Professional players are trained from adolescence; thus, the educational level is relatively low. The hidden troubles mentioned above will limit E-Sports industry development. To study the profitability and model, E-Sports is considered as E-Sports industry. The specific attribute of E-Sports is diluted, relative indexes of profitability are extracted, and statistic models are used. Two main products are studied, traditional online business model is used for reference, and innovative points of profitability is discussed, moreover, the expectation and advices are given. Another paper used “Five elements” which includes profit source, profit point, profit targets, profit leverage, and profit barrier to analysis the status of E-Sports, and provided advices. Since some of the E-Sports companies are listed company, 27 E-Sports listed companies are studied using the financial data. Another study focused on ten indexes related to profitability based on operation, development, repayment and so on.

In the paper, A club is chosen as study object. It belongs to Suzhou XingLi Network Technology Co., LTD which is a well-developed E-Sports company. The company includes two E-Sports sector and club sector. Club sector includes competition training and operating. Competition training center is assesed using results in various competitions as indicators for performance appraisal. Operating center is assesed using the amount of fan traffic. E-Sports sector ensures the club profitability.

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To analysis the data related to the profitability, factor analysis model is introduced.

2. Factor Analysis Model

2.1. Model Establish

The original variables are interrelated but also different. The factor analysis is a model to reduce the dimensionality of original variables dimensionality. It could identify common factors from the complex factors. All the original variables convert to a few aggregate variables.

Factor loading is the statistical measure used to quantify how much of the variance in a variable is explained by a given factor. Variables communality is the information of explanation by factors, and the closer the value to 1, the information explained by factor is higher. Factor score is used to evaluate the score in every sample, which includes the information of original variables. The function of factor score is shown below.

$$F_t = \beta_{i1}X_1 + \beta_{i2}X_2 + \cdots + \beta_{in}X_n, \qquad i = 1,2,\cdots \tag{1}$$

The key steps of factor analysis are KMO and Bartlett test, factor variable construction, factor rotation and score calculation [4].

2.2. Data Source and Preprocessing

2.2.1. Original Data and Indicators Selection

A club and other 14 clubs which have the similar scale are chosen. 9 indexes related to profitability are adopted. 9 indexes are income from investment (x_1), live signing (x_2), the number of core fans (x_3), the number of KOL fan (x_4), operating costs (x_5), media platform volume (x_6), sponsor (x_7), event prize money (x_8) and related product (x_9).

2.2.2. Factor Analysis Applicability Test

Before using factor analysis, data need to verify the multicollinearity through the KMO test and Bartlett test. The results of data in 2021 are shown in Table 1. It shows that the KMO test is 0.762, which is larger than 0.5, and the significance value is less than 0.05 in Bartlett test. It means data of indicators in 2021 has significant collinearity, and the data is suitable for factor analysis.

Table 1. BMO Test and Bartlett Test

KMO Measure of Sampling Adequacy		.762
Bartlett Test of Sphericity	χ^2	126.266
	DOF	36
	Significance	.000

2.2.3. Common Factor Identification

Common factor variance of data in 2021 is shown in Table 2, and the extract value of current ratio x_5 is lowest, which is 0.63. Extract values of remaining indicators are between 0.81 to 0.95. All the information indicates the original variables could be well expressed by common factors, especially the extract value of live signing x_2 and the number of core fans x_3 are more than 0.9. In conclusion, the loss of original data identified by three common factors is little.

2.2.4. Total Variance Explanation

The total variance explanation in 2021 is calculated. Three factors could explain 85.5% information of original data. Therefore, 3 common factors could express more than 80% information. So 3 common factors are kept.

2.2.5. Interpretations of factors

Using Varimax rotation with maximum variance to rotate the component matrix. Related results are shown in Table 4, which are represent the data of 2021.

Table 2. Common factor variance

	Original	Extract
x_1	1.000	.816
x_2	1.000	.946
x_3	1.000	.937
x_4	1.000	.864
x_5	1.000	.63
x_6	1.000	.887
x_7	1.000	.896
x_8	1.000	.89
x_9	1.000	.831

Table 3. Total variance explanation

	Initial eigenvalue		Extraction Sums of Squared Loadings		
	Total	Var %	Total	Var %	Var %
1	5.524	61.383	5.524	61.383	61.383
2	1.324	14.710	1.324	14.710	76.093
3	.849	9.434	.849	9.434	85.526
4	.587	6.526			
5	.329	3.654			
6	.239	2.660			
7	.100	1.106			
8	.044	.491			
9	.003	.036			

Table 4. Rotation composition matrix 1

	Factor		
	1	2	3
x_1	0.676	0.465	0.378
x_2	0.925	0.215	0.212
x_3	0.012	0.198	0.908
x_4	0.926	0.2	0.201
x_5	0.786	0.085	-0.068
x_6	0.783	0.508	-0.124
x_7	0.495	0.799	0.111
x_8	0.077	0.892	0.296
x_9	0.669	0.206	0.583

Common factor F_1 is named as operation indicator factor. It has larger loading on KOL fan (x_4), live signing (x_2), return on equity x_2, investment (x_1), media platform volume (x_6), operating costs (x_5), related product (x_9). Common factor F_2 is named as contract indicator factor. It has larger loading on sponsor (x_7), event prize money (x_8). Common factor F_3 is named as influence indicator factor. It has larger loading on the number of KOL fan (x_4).

2.2.6. Evaluation Model

According to the factor score coefficient matrix, evaluation model based on data in 2021 of F_1, F_2, F_3 has established. And the score function F is:

$$F = 0.72 \times F_1 + 0.17 \times F_2 + 0.11 \times F_3 \quad (2)$$

2.2.7. Empirical Analysis

Using function (2), 15 clubs are calulated, and the scores are shown in Table 5. A club(the club numer 1) got the highest score. And the F_1 indicator is ranked as 2nd, and F_2 is 3rd. It shows that A club should take contract factor into account.

Table 5. F scores among 15 clubs

Club number	F_1	F_2	F_3	Scores
1	1.98795	0.79859	2.32849	1.82
6	2.26709	0.53206	-1.22848	1.58
15	0.8201	0.2265	-0.59972	0.56
13	0.31712	-0.92813	-0.48615	0.01
2	-0.09317	-0.94497	0.62124	-0.16
5	0.05767	-0.8156	-0.90118	-0.2
12	0.09809	-1.36409	-0.30408	-0.2
7	-0.89489	1.39552	0.86846	-0.31
8	-0.43039	0.68203	-1.08885	-0.31
10	-0.41836	-0.37429	0.01386	-0.36
3	-0.83173	1.80478	-0.88351	-0.38
9	-0.44189	-1.20043	0.58793	-0.46
4	-0.97786	0.92008	0.71002	-0.47
14	-0.58181	0.07101	-0.69837	-0.48
11	-0.8779	-0.80308	1.06033	-0.65

3. Trend Analysis Approach

3.1. Model Establish

Trend analysis is based on differential analysis and ratio analysis method. The same indexes are studied using fixed based contrast and sequential comparison. Whether result of rise or fall is given.

Error sequence is the difference between the expection and real values. Seasonal factors correction sequence is the average value of every four months to seperate the trend value and periodic fluctuation. Seasonal factor is quantitative description of given variable due to periodic variation. Long-term trends and cyclic change sequences represent the sequences that are affected by long-term economic factors[5,6].

The key steps of trend anaylsis approach are definition, influencing factors decomposition, comparison, figures drawing and prediction.

3.2. Data Screening and Indicator Specification

Indicators related to time series are applied in trend analysis, and A club data from 2017-2021 are collected. The indicators are the number of core fans (x_3), the number of KOL fan (x_4), operating costs (x_5), media platform volume (x_6) and related product (x_9). Data of 5 indicators from 2017-2021 are figured based on time-series. One the whole, all the indicators show an increasing trend. In the view of varieties, the number of core fans (x_3) and media platform volume (x_6) are more smooth, and he tendency chart of operating costs (x_5) and related product (x_9) fluctuate obviously because of the COVID-19. From the seasonal factor sequence diagram, related product (x_9), operating costs (x_5) and media platform volume (x_6) are affected by season[7-9].

Based on different indicators, various models are applied. In Table 6, Exper modeler and prediction are shown.

Table 6. Exper Modeler and Prediction

		L jung-Box Q(18)					parameters			
indicator	model	DF	Sig.	outlier	R^2	Smooth R^2	estimation	SE	t	Sig.
x_9	Winters add	15	.03	0	.89	.29	.60	.24	2.7	.02
x_4	ARIMA	17	.79	0	.96	.17	.69	.19	3.7	.00
x_3	ARIMA	18	.57	0	.98	.00	769.8	138	5.6	.00
x_5	Winters add	15	.63	0	.91	.20	.19	.12	1.5	.15
x_6	Winters add	15	.36	0	.99	.61	.70	.24	2.8	.01

In Table 6, 5 indicators are at the best fit in their models. The sig. value in every model is less than 0.05, which means the residual sequence are not random. Sig. Value of operating costs (x_5) is 0.15, larger than 0.05. The rest of them shows the model is effective. In Table 7, The predicted values and true values are shown.

Table 7. Prediction in Quarter

Indicator	x_4	x_3	x_5	x_6	x_9
Prediction	15193995	17151	242165	83945515	25055
True	15219008	17256	258690	8517963	26110

3.3. Empirical Analysis

From the table and correlation fitting curve, in the 3rd quarter 2019, KOL fans(x_4) rise rapidly, and turn to stable in 4th quarter 2020, and the error is 0.The degree of fitting is well enough. From 2020 to 2021, there is a certain gap between prediction value and true value. Because at the end of 2021, A club won a champion in world league. The KOL attracted a lot of fans in a very short time. Moreover, in the end of 2019 to 2020, the number of fans increased rapidly due to the COVID-19. People worked at home, and entertainment such as KTV, eating in the restaurant, fitness room, shopping mall and so on were closed. People used more time on Internet, and online games. Many potential amateurs turned to be KOL fans.

The fitting curve of core fans(x_3) is relative stable. The predicted value is close to true value. The core fans put efforts into the clubs, and if a fan turns to core fan, he will pay more money and attention on the activity, games, and so on. They would not attracted by other clubs.

The error of indicator related product(x_9) is tiny, but the degree of fitting is not. Since the order of magnitude is small, it doesn't affect the predicted value. Related products are affect by the publicity of the club. It is also affected by season, evironment, time, cost performance and so on. A higher precision model should be applied. Moreover, In the 4th quarter 2019, the prediction is not well due to the players of A club did poorly in the games. In the 4th quarter 2020, the COVID-19 limited the speed express.

In the trend figure media platform volume (x_6) did not fluctuate obviously, and the prediction is well.

Operating cost(x_5) has the different predicted values in different point-in-time. In 2019, the cost progressively increase, since it is the most serious time of COVID-19. Similar situation happened in 2020. Players went abroad to attend the competition. They had to stay in hotel for at least 14-day quanrantine. It raised the operating cost.

4. Conclusion

Using factor analysis and trend analysis, indicators related to profitability has been collected. In the factor analysis, three factors are given, which are operation, contract and influence. 15 clubs are ranked using the function. A club got the highest score among the clubs. To analyze the effect of time to A club, data of every quarter in 2017-2021 are modeled. 5 indicators are modeled using different models.

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