RESEARCH ON THE COPYRIGHT VALUE OF INTELLECTUAL PROPERTY DRAMAS

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by
YANG CHEN
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Examining Committee Members:

Connie X. Mao, Advisory Chair, Finance, Fox School of Business, Temple University
Jay Choi, Finance, Fox School of Business, Temple University
Xiaohui Gao Bakshi, Finance, Fox School of Business, Temple University

Martin Grace (external reader), Risk, Insurance, and Healthcare Management, Fox School of Business, Temple University

ABSTRACT

In recent years, some TV series adapted from literary works, such as Ghost Blows Out Light the Light and Silent Separation, have become widely popular, making intellectual property (IP) one of the hottest areas of the surge of IP copyright investment. The “Internet Plus” era, supported by big data technology and the entertainment industry, especially film and television, is transforming production from a non-standardized to a standardized mode. Film and TV dramas based on online novels, their derivative products as games, anime, and so on are taking up an increasing share in the entertainment industry. This paper investigates the valuation of IP copyrights based on a dataset of film and television dramas. analyzes the creation law of film and television and develops a relatively accurate evaluation system for films and television dramas by using an integrated big data of various index, such as content, market potential, creation team, production team, and IP derivatives. Such a valuation model not only guides the production and creation of film and TV dramas to achieve standardization of IP production, but also helps price IP copyrights accurately, thereby promoting a healthy and efficient development of film and television dramas in the “Internet Plus” era.

Key words： Intellectual property, IP dram， Analytic network process

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I declare that this dissertation is written by myself and complies with University regulations on plagiarism.

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CHAPTER 1

RESEARCH MOTIVATION

Background

"IP" is the standard abbreviation for "intellectual property" and copyright is a type of IP. Since 2014, IP has been having a growing impact on the entertainment industry. Unlike the concept of intellectual property in a broad sense, in China—especially in network media operations—IP has been given a new definition, that is, the operation of cross-media content with high commercial value and vitality. The content may be a book, play, song, movie, game, or even a simple concept, which can then be used to develop film and television shows, games, and other copyright-related products, such as theme parks and a series of derivative products.

With the popularity of games, novels, and animation as the prototype adaptation of movies and TV series, the ratings of major television stations and video websites have steadily increased. Nowadays, these super IP shows occupy most of the market share. Some public data indicates that the share of IP TV shows has increased from 2017 to 2019. In 2018, the proportion of IP TV series reached more than 60 percent, including traditional TV and IP dramas (Figure 1), and rose to 71 percent in 2019. The top 10 TV series in the annual broadcast list included six shows that were IP dramas (Table 1). Some of the most popular series, such as "The Untamed," "The Longest Day in Chang'an," and "Joy of Life," hit the jackpot. After several years of development, people have a better knowledge of IP, and IP itself has created a new economy in China. The huge consumption capacity of fans of IP dramas has also promoted the evolution of an IP fan economy, while also maintaining the high rate of adoption of IP in domestic film and television production. Nevertheless, because of people's fanatical following of these dramas, the price of IP shows has also

repeatedly reached new heights in recent years. With the rapid rise of copyright prices, the entertainment industry seems to be one of the most promising industries in China's economic development over the next five years, with great investment potential.

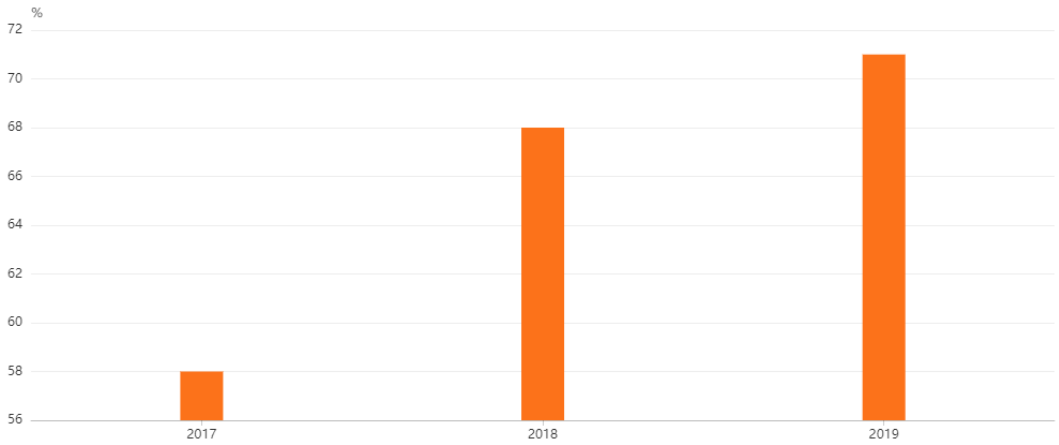


Figure 1 Percentage of IP dramas among TV shows (2017–2019)
(Data Resource: data.iimedia.cn)

Table 1 The Top 10 TV Dramas of 2019

Ranking	Name	Ratings
1	Go Go Squid (IP drama)	84.9
2	All is Well (IP drama)	84.2
3	The Untamed (IP drama)	84
4	Xiao Huan Xi	82.9
5	Shao Nian Pai	82.7
6	The Longest Day in Chang'an (IP drama)	82.3
7	The Thunder	81.7
8	The King's Avatar (IP drama)	80.1
9	My True Friend	79.7
10	Joy of Life (IP drama)	79.5

(Data Resource: Aiqiyi Online Data and Yien Consulting)

However, with prosperity comes problems and contradictions that may restrict the

continuous development of the industry; it has become common knowledge that IP is overamplified. According to the ratings of some popular shows in recent years, the continued upsurge of IP dramas has resulted in problems such as poor production levels, low quality of the shows, and excessive commercialization. These will directly affect the audience's enthusiasm for the series and may lead to some unexpected results. For example, the lack of pricing principles and the erratic pricing of transactions and the simple, rough development of many high-quality IP resources risk resulting in a sharp depreciation or even complete damage of copyright value with an excessive dependence on fans and catering to their tastes. Situations such as these will lead to a deterioration of artistic quality in film and television creation and may seriously affect the healthy development of the domestic IP adaptation industry.

Film and television works are different from other industrial products. For example, if we only rely on IP itself to attract consumers across borders, the marginal benefits of IP dramas will inevitably be reduced. Some simplify IP as film and television and only consider the volume of existing IP fans but not how to adapt IP into high-quality scripts. Others only consider whether the actors can attract their own fan base but not whether the actors' acting skills match the roles. These types of problems can lead to the loss of original IP fans and threaten to greatly impair the value of IP, potentially damaging the positive development of the industry.

In view of the current development of IP dramas, this paper explores the creation of IP film and television drama law during the "Internet Plus" era. With the support of big data on films and television dramas, I intend to develop a data analysis system for IP dramas using a multi-dimensional analysis to yield an accurate valuation model of copyrights for IP dramas, which will, in turn, facilitate the healthy development of the industry. The traditional understanding of the core value of IP is primarily about fans. At least when

pricing IP at an early stage, practitioners usually use quantifiable indexes based on the number of IP fans as the pricing basis. However, this pricing model based on the volume of fans has some limitations. An IP novel normally has a specific group of fans and a one-step novel is estimated to have 2–3 million readers. Although this is regarded as a medium-sized readership for a novel, once it is adapted into a game, movie, or TV show, 2–3 million fans would be considered a very limited consumer group compared to China's huge population base. Moreover, it will also involve a fan conversion rate as fans of novels may not become fans of the movie or television adaptations. Therefore, in this paper, we will analyze and evaluate the four aspects of IP dramas, namely, popularity, market potential, operation team, and content, to develop a more comprehensive pricing model of IP shows.

Research Objective

Modern economics has proven that an excellent valuation system not only helps enterprise managers better understand value elements, control value elements, and determine development findings at the micro-level but also provides rules for the development of the whole industry at the macro-level (Qiu, 2017). Therefore, valuation is the key point of the selection, cultivation, development, transaction, and development of IP dramas. It not only provides the evaluation rules for IP value conversion but also provides guidance on IP development. Based on Saaty's (1996) analytic hierarchy process, this paper will use the theory of value evaluation in economics to analyze the internal driving elements of the value of IP adaptation and form a targeted, comprehensive, and detailed evaluation method. This paper will analyze and evaluate IP dramas based on 4 first-level index (IP popularity, market potential, operation team, and IP content); 14 second-level index (popularity in Tieba, topic popularity, fans of authors, fans of actors, search volume, click volume, download volume, viewing volume, director, screenwriter, producer, issuer, theme, and plot); and 32 third-level index. The broadcasting data of IP

dramas will be used to verify the validity of the model. Thus, this model comprehensively evaluates the value of IP adaptation from multiple perspectives, guides the reasonable pricing of IP copyright, assists investors in investment decisions, and urges the healthy development of the industry.

CHAPTER 2

LITERATURE REVIEW

International Research Status

There are three valuation methods of IP rights in the international literature, namely, cost, market, and profit evaluation.

Cost Valuation Model

The cost method is a widely used valuation approach (e.g., Reilly, 2009). It uses the classical statistical method to measure the cost and includes time costs in the valuation category, which is a relatively simple and effective method for valuing intangible assets whose income and current income have not been determined. Based on the cost method, Goldheim, Slowinski, Daniele, Hummel, and Tao (2005) further proposed a specific replacement cost method that avoids the valuation of intangible assets that are included in the cost method during a business merger.

Market Valuation Model

The market method is based on the principles of the market economy, which are embodied in competition and balanced investment in the market determined by supply and demand. Anson, Noble, and Samala (2014) believed that a large number of IP rights belong to private companies and individuals and that the availability and exchange convenience of relevant information affects the application of the market method to valuation. Katarzyna and Mateusz (2014) confirmed that the convenience of information exchange is not the main factor affecting the application of the market method. Wandtick (2012) proposed a comparative pricing method that focuses more on the valuation of trademarks, reputation, franchises, licenses, etc.

Profit Valuation Model

This method estimates the value of intangible assets by calculating the value of future cash flow generated during the expected economic life of intangible assets. Berinde and Petrica (2015) focused on the derivative income determined by this method in the real estate field. Michael (2009) used the capitalized earning method to evaluate IP rights. The core is that the price should be "a part of the income or profit of the technology recipient," that is, the "Licensor's Share of License's Profit method." This method can capitalize the cost and simplify the application cost in a depressed economic environment.

The three aforementioned models have different emphases; some are based on cost, while some are based on other characteristics, such as advantages and disadvantages, as the main index that can improve the copyright valuation system in one or more aspects.

Domestic Research Status

In the "Internet Plus" era, the development of the entertainment industry cannot be separated from the use of big data. With the promotion of big data technology, the film and television industry is transforming from nonstandardization to standardization. In recent years, TV dramas adapted from online novels, games, and animated themes have occupied an increasing share of market, and the popularity and consumption power of its huge fan bases have also increased, which is an important component of the film and television market that cannot be ignored. The focus of the evaluation of the IP value by scholars in China will be discussed in the following section.

Valuation of IP Works

According to the regulations of the China's Assets Valuation Criteria - Intangible Assets, the valuation methods of intangible assets "mainly include the cost method, income method, and market method, and the certified public valuers should choose according to the relevant conditions of intangible assets,"(China Appraisal Society ,2017,pp.5) but the

criteria do not explicitly refer to the selection method of the issuer. Domestic scholars have also emphasized different aspects of the evaluation of IP copyright value. The cost, income, and market method, as the traditional intangible assets valuation methods, still occupy an important position in the copyright valuation of film and television works.

Jiang (2018) used the comprehensive evaluation method to evaluate the IP value of network literature from current value, platform operation ability, and derivative value of the work. Qiu (2017) divided content-based IP into four stages and forms—embryonic stage, incubator, development stage, and mature stage—and constructed a multi-level value evaluation system around the four main values driving elements within IP, such as "user's emotional interests," "market resource cohesion," "timeliness element," and "copyright ownership element." Meanwhile, Wang (2016) analyzed the creation–broadcasting–marketing stage of the online drama industry chain, combined with the new era characteristics of new media, and established an online drama value evaluation system based on the industry chain. The influential factors in the system can help a production company to better focus on the production process, especially at each stage where there are relatively clear influential factors. It can also help marketing agencies have a better entry point to promotion. Wu and Gao (2014) determined the weight of the evaluation index of TV drama copyright trading through the application of analytic hierarchy process (AHP), assigning a grade to the dramas that provided a certain reference for TV drama introducers. Zeng (2017) conducted a quantitative analysis based on the market method by drawing lessons from 42 previous trading cases and introduced 11 factors to establish a multiple linear regression model combined with the AHP. Eventually, the main factors included investment cost, production type, number of reviews, score, authorized content, and GDP in the film copyright value evaluation model. Yang (2015), Pan (2014), and others compared the cost, income, and market method and identified the application of different

models. When film and television copyright were faced with the value evaluation model of pledge, they conducted a qualitative analysis and finally demonstrated the selection of different evaluation models and methods through the case of Baolian lamp pledge financing. Zhao (2018) built a prediction model by predicting the implicit value of IP content, selecting the recommended amount, the total number of comments and other index, and mining the potential value of Internet novel IP through association analysis.

Additionally, Zhang (2014) proposed some research on the derivative value of film and television works, using the drama The Love from the Star as an example. He analyzed the various components and specific amount of the derivative value, thus forming a holistic view of the development of film and television works and their dual values.

Furthermore, given factors other than IP content, Li (2017) chose to discuss the value development of works with a live animation version as an example and mentioned the invisible intervention of the network as the media value of the works, thereby highlighting the important role of the mass media. Thus, he analyzed the indispensable position of the network platform in the value evaluation of film and television works from a qualitative perspective. Zhang and Li (2017) analyzed IP development from three perspectives, namely, box office, fans effect, and the industrial chain. They emphasized the strong correlation between fans and the IP industrial chain, arguing that the fans effect was an important factor that must be considered during the process of IP development. Zou (2017) analyzed the value of films and dramas from the five perspectives of communication subjects (team commercialization and screenwriter IP), content, channel, audience, and the effect of IP works. She also offered a supplementary explanation of the quantitative influence of IP works from the perspective of communication, thus providing a reference for the establishment of an IP development network.

CHAPTER 3

RESEARCH METHODS AND MODEL SELECTIONS

The analytic network process (ANP) method was developed based on the AHP established by Professor T. L. Saaty of the United States in the mid-1970s. It is used in decision-making analysis in many fields because of its characteristics for dealing with multi-dimensional decision-making elements using a combination of qualitative and quantitative analysis and its flexibility, system, and simplicity. The core of the AHP method is dividing the system into different levels and analyzing the dominating effect of the upper-level elements on the lower level elements, while the elements on the same level are independent of each other. However, for many complex decision-making problems, the internal elements of each level are often interdependent, and lower level elements will affect the upper-level elements in the same way, that is, there is a feedback effect. The system structure is similar to a network structure. Therefore, Professor Saaty proposed a new theory and method of ANP in 1996. In contrast to AHP, ANP considers the mutual influence of various factors and levels and uses a supermatrix to analyze the factors of interaction comprehensively to obtain the mixed weight.

ANP has been applied to many fields, including economic forecasting, energy strategic planning, forest management, industrial management, logistics supply, and strategic partner selection, which fully demonstrate its effectiveness at solving complex multicriteria decision-making problems. For example, Joseph (2003) evaluated the environmental awareness of enterprises using the ANP method and provided an effective strategic analysis framework using the ANP model. Niemira (2004) used the ANP method to predict the possibility of a financial crisis by studying and establishing a crisis turning point model.

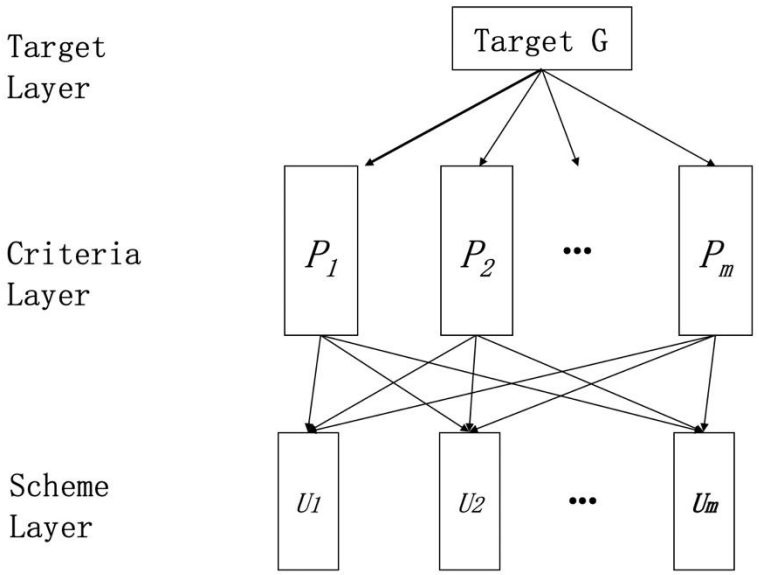
When analyzing IP network drama, there are interrelations and influences among the index levels. Therefore, this paper will use the ANP method to analyze the relationships between the indexes of IP network drama, form a decision-making model, and assist in the pricing of IP drama.

Overview of the Analytic Hierarchy Process and the Analytical Network Process

Structural Analysis of AHP

A typical structure diagram of AHP includes the target layer, rule layer, and scheme layer. The rule layer includes the criteria of P_1, P_2, …, P_m. The scheme layer includes U_1, U_2, …, U_n。. There are three basic assumptions in AHP:

1) there is no feedback dominance between layers;
2) there is no mutual influence or domination between elements in the layers;
3) a dominant relationship only exists in adjacent layers, and cross-layer elements have indirect dominant relationships, not direct dominant relationships.



The Construction of a Judgment Matrix

AHP and ANP were designed to judge the importance of the two elements of a certain criterion and then calculate the weight of each element after constructing a judgment matrix.

According to the example of the ANP typical stricture, each equation U_i(i = 1, 2, …, n) under a certain criterion P_s, the positive reciprocal judgment matrix is obtained according to the definition of the judgment scale, as shown in the following table:

P_s	U_1	U_2	$\cdots$	U_n
U_1	a_{11}	a_{12}	$\cdots$	a_{1n}
U_2	a_{21}	a_{22}	$\cdots$	a_{2n}
$\vdots$	$\vdots$	$\vdots$		$\vdots$
U_n	a_{n1}	a_{n2}	$\cdots$	a_{nn}

In the matrix, a_{ij} represents the importance of U_i and U_j under the criterion of P_S. Among them, $a_{ji} = \frac{1}{a_{ij}}$, i = 1, 2, …, n; j = 1, 2, …, n. The value on the diagonal is the comparison between the element U_i and itself, so they are all 1 and the matrix of $n \times n$ must be judged by $\frac{n(n-1)}{2}$ times.

Judgment Scale Principle

Scale	Meaning
1	Experts believe that when i and j are compared, they are of the same importance
3	Experts think i is more important than j.
5	Experts believe that i is obviously more important than j.
7	Experts think i is very important when compared with j.
9	Experts believe that when i is compared with j, i is absolutely more important.
2, 4, 6, 8 Reciprocal	Intermediate value status of the above scale description; if the ratio scale of i and j is aij, the ratio scale of j and i is aij = 1/aij.

Weight Vector Solution

The methods for calculating weight vectors mainly include the sum method, square

root method, logarithmic least square method, least square method, and characteristic root method. This paper only introduces the widely used square root method, and follows the following calculation steps:

a) The geometric average of all elements in each row of the judgment matrix is:

$$W_i = \sqrt[n]{\prod_{j=1}^{n} a_{ij}} \quad i = 1, 2, \ldots, n$$

Normalizing $W_i = \sqrt[n]{\prod_{j=1}^{n} a_{ij}}$, which is,

$$w_i = \frac{\overline{Wi}}{\sum_{i=1}^{n} \overline{wi}} \quad i = 1, 2, \ldots,$$

Here, $w = (w_1, w_2, \ldots, w_n)^T$ is the approximate value of the eigenvector, which is U_1, U_2,…, U_n. Under the rule of P_S, the according weights of U_1, U_2,…, U_n. are W_1, W_2, …, W_n.. The original judgment matrix is transformed into the following:

P_S	U_1	U_2	.....	U_n	*Normalized Eigenvectors*
U_1	a_{11}	a_{12}	.....	a_{1n}	w_1
U_2	a_{21}	a_{22}	.....	a_{2n}	w_2
⋮	⋮	⋮		⋮	⋮
U_n	a_{n1}	a_{n2}	.....	a_{nn}	w_n

b) Calculating the maximum eigenvalue of the judgment matrix λ_{max}:

$$\lambda_{max} = \sum_{i=1}^{n} \frac{(AW)_i}{nW_i}$$

c) Calculating the consistency index of the judgment matrix and testing its consistency.

As it is impossible to make an overall judgment completely consistent when judging a group of elements with two important degrees, this kind of estimation error will inevitably lead to the deviation of each eigenvector and eigenvalue. To avoid this error in the result when the deviation exceeds a certain degree, it is necessary to check the consistency of the judgment matrix to control the error. Thus, the consistency index is calculated as follows:

$$CI = (\lambda_{max} - n)/n - 1$$

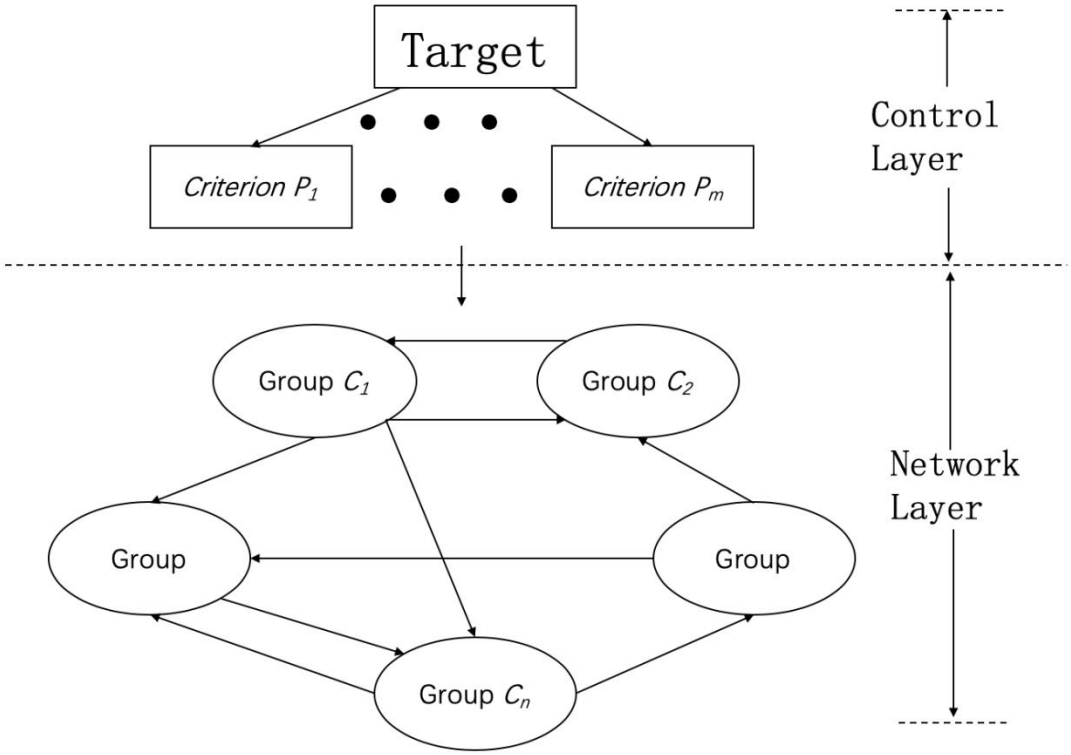
Generally, when it is less than or equal to 0.1, the judgment matrix is considered acceptable; otherwise, the judgment matrix must be adjusted. When the dimension n of the judgment matrix is larger, the consistency of the judgment matrix will deteriorate. Therefore, the average consistency index RI is introduced, and a more reasonable consistency ratio (CR) is taken to determine the consistency of the matrix. When the CR is less than or equal to 0.1, the consistency of the judgment matrix is acceptable. Among them, CR = CI/RI.

The algorithm of the mean random consistency index

Matrix	1	2	3	4	5	6	7	8	9	10	11	12	13	14
R.I	0	0	0.58	0.90	1.12	1.24	1.32	1.41	1.46	1.49	1.52	1.54	1.56	1.58

Structural Analysis of ANP

ANP first divides the system elements into two parts. The first part is called the control factor layer, which includes the problem objectives and decision criteria. All decision criteria are considered independent of each other and only controlled by the objective elements. There may be no decision criteria in the control factors, but in one objective. The weight of each criterion in the control layer can be obtained using the traditional AHP method. The second part is the network layer, which comprises all the elements controlled by the control layer, and its internal structure is the network structure. The typical ANP structure can be summarized as follows:



Dominance

An important step of AHP is to compare the dominant elements with each other under one criterion to obtain the judgment matrix. However, in ANP, the elements under comparison may not be independent but interdependent; thus, the comparison will be conducted in two ways:

a) Direct dominance: given a criterion, two elements compare the importance of the criterion.

b) Indirect dominance: a criterion is given to compare the influence of two elements on the third element (called a sub-criterion) under the criterion. For example, to compare the advantages of A and B in terms of commodity marketing ability, results can be obtained indirectly by comparing their influence on the marketing strategy adopted by the chairman.

The former comparison applies to a situation where the elements are independent of

each other, and the second one is applicable where the elements are interdependent.

Super Matrix and Weighted Super Matrix of ANP Structure

If the control layer of ANP contains element $p_1, \ldots, p_n$, under the control layer, the network layer has the element group $C_1,\ldots C_n$, where C_i includes the elements of $e_{i1},\ldots e_{in_i}$, $i = 1, \ldots, N$. By taking $P_s(s = 1,\ldots, m)$ as the rule in the control layer and $e_{jl}(l = 1, \ldots, n_j)$ in C_j as the sub-criteria, the elements in element group C_i are compared according to their influence on e_{jl}, that is, the judgment matrix is constructed, which is as follows:

Under P_S,

e_{jl}	$e_{i1}, e_{i2}, \ldots\ldots e_{in_i}$	*Normalized Eigenvectors*
e_{i1}		$W_i^{(j_1 l)}$
e_{i2}		$W_i^{(j_2 l)}$
……		……
e_{in_i}		$W_i^{(j_{ni} l)}$

And getting the sorting vector by the characteristic root method $w_{il}^{(jl)}, \ldots, w_{inl}^{(jl)}$. Marking w_{ij} as

$$W_{ij} = \begin{bmatrix} w_{i1}^{(j_1 1)} & w_{i1}^{(j_2 2)} & \cdots & w_{i1}^{(j_{n_j} j)} \\ w_{i2}^{(j_1 1)} & w_{i2}^{(j_2 2)} & \cdots & w_{i2}^{(j_{n_j} j)} \\ & & \vdots & \\ w_{in_i}^{(j_1 1)} & w_{in_i}^{(j_2 2)} & \cdots & w_{in_i}^{(j_{n_j} j)} \end{bmatrix}$$

Here the column vector of W_{ij} is the element e_{i1} in $C_i, \ldots, e_{in_i}$ for $e_{ji}, \ldots, e_{jn_j}$ in C_j.

If the element in C_j is not affected by elements in C_i, $W_{ij} = 0$, the supermatrix under P_S can be obtained as follows:

$$1 \ldots n_1 \; 1 \ldots n_2 \ldots 1{-}n_N$$

$$W = \begin{array}{c} 1 \\ \vdots \\ n_1 \\ 1 \\ \vdots \\ n_2 \\ \vdots \\ 1 \\ \vdots \\ n_N \end{array} \begin{bmatrix} W_{11} & W_{12} & \cdots & W_{1N} \\ & & & \\ & & & \\ W_{21} & W_{22} & \cdots & W_{2N} \\ & & & \\ \vdots & & & \\ & & & \\ W_{N1} & W_{N2} & \cdots & W_{NN} \end{bmatrix}$$

There are m hypermatrices in total, all of which are nonnegative. The sub-block W_{ij} of the hypermatrix is strongly normalized, but W is not strongly normalized. Therefore, the criterion C_j(j = 1, …, N) for each group of elements under P_S is,

C_j	$C_1 \ldots\ldots C_N$	Normalized Eigenvectors
C_1		a_{1j}
⋮	⋮ $j=1,\ldots\ldots,N$	
C_N		a_{Nj}

The rank vector component corresponding to the group of elements independent of C_j is zero, so the following weighted matrix is obtained:

$$A = \begin{bmatrix} a_{11} & \cdots & a_{1N} \\ & \vdots & \\ a_{N1} & \cdots & a_{NN} \end{bmatrix}$$

By weighting the elements of the hypermatrix W, we get $W = (W_{ij})$, where

$$W_{ij} = a_{ij}W_{ij} \quad i = 1, \ldots, N, j = 1, \ldots, N$$

W is the weighted supermatrix and its sum of columns is 1, which is called a random matrix. For the sake of simplicity, if specified, the following hypermatrices are all weighted matrices and are still represented by the symbol W.

The Calculation Principle of the Limit Relative Ordering Vector

If the element of the (weighted) supermatrix W is w_{ij}, the size of w_{ij} reflects the one-step dominance of element i over element j. The dominance of i over j can also be obtained by $\sum_{k=1}^{N} W_{ik}W_{kj}$, called two-step dominance, which is when the element of W^2 and W^2 is still strongly normalized. When $W^{\infty} = \lim_{t\to\infty} W^t$ exists, the j column of W^{∞} is the limit relative ordering vector of each element to element j in the network layer under Ps.

Therefore, when a cycle system is dependent on a certain level, its supermatrix W limit exists, that is, W exists, and each column is the normalized eigenvector corresponding to eigenvalue 1. For the existence of the hypermatrix limit of the internal dependent correlation structure, the relative ordering vector of the system elements can be obtained by finding the normalized eigenvector of the hypermatrix W with respect to the eigenvalue 1. When the elements of each column are similar, the column vector can be approximately considered as the eigenvector corresponding to the eigenvalue 1. The ANP structure model set up in the following section is just such a kind of interdependent model.

CHAPTER 4

STATISTICAL ORGANIZATION

Indexes Construction

Given the current development of IP dramas, in the background of the “Internet Plus” era, this paper relies on the support of big data on film and television. Through multi-dimensional analysis, it forms a reasonable data evaluation system for IP dramas to realize their rational pricing of copyright value, assist investment decisions, and promote the development of the industry. Therefore, in this paper, we will analyze and evaluate the IP dramas through 4 primary index (IP popularity, market potential, operation team, and IP content); 14 secondary index (popularity in Tieba, topic popularity, fans of authors, fans of actors, search volume, click volume, download volume, broadcast volume, director, writer, producer, publisher, theme, and plot, which are normally used to measure the performance of a drama); and 32 tertiary index (see Table 2) to develop a more comprehensive pricing model of IP dramas.

Table 2 Evaluation Index

	Primary Index	Names of Primary Index	Secondary Index	Names of Secondary Index	Tertiary Index	Names of Tertiary Index
Evaluation	IP Popularity	F1	Popularity in Tieba	F11	Popularity in Tieba	F111
					Content in Tieba	F112
					Ambiance	F113
			Topic popularity	F12	Focus	F121
					Users analysis	F122
	Market Potential	F2	Fans of authors	F21	New users	F211
					Users actually using	F212
			Fans of actors	F22	New users	F221
					Users actually using	F222
			Search volume	F23	Search volume	F23
			Click volume	F24	Click volume	F24
			Download volume	F25	Download volume	F25
			View volume	F26	View volume	F26
	Operation Team	F3	Directors	F31	Responsibility	F311
					Popularity	F312
					Professionalism	F313
			Screenwriter	F32	Responsibility	F321
					Popularity	F322
					Professionalism	F323
			Producer	F33	Financial support	F331
					Embedded advertising revenue plan	F332
					Promotion plan	F333
			Issuer	F34	Issuance plan	F341
					Issuance fund	F342
					Issuance channel	F343
	IP Content	F4	Theme	F41	Novelty	F411
					Whether hot issues	F412
			Plot	F42	Narrative style	F421
					Details description	F422
					Characteristics	F423
					Theme connotation	F424
					Structure relation	F425

Index Analysis

Criterion Layer

Building the Judgment Matrix

To further analyze the development of IP shows, this paper invited 20 experts from the film and television industry to score them. A brief introduction to each show is presented in Appendix 1. Combined with the experience of industry experts, the existing IP index were evaluated by experts to further improve the rationality of the evaluation index. The formula is as follows:

Judgment Matrix

A	F1	F2	F3	…	Fn
F1	F11	F12	F13	…	F1n
F2	F21	F22	F23	…	F2n
F3	F31	F32	F33	…	F3n
…	…	…	…	…	…
Fn	Fn1	Fn2	Fn3	…	Fnn

Element Fij indicates the importance of element i compared with element j in the analysis of F; and Fii = 1; Fij > 0, Fij = 1/fji. The judgment scale is described according to relative importance, and the measurement value is 1–9. The judgment principle of the screenshot is as follows:

Judgment Scale Principle

Scale	Meaning
1	Experts believe that when i and j are compared, they are of the same importance
3	Experts think i is more important than j
5	Experts believe that i is obviously more important than j
7	Experts think i is very important than j
9	Experts believe that when i is compared with j, i is absolutely more important
2, 4, 6, 8	Intermediate value status of the above scale description

According to the judgment matrix elements determined by experts, the element values are as follows:

Table 3 Criterion Level Index Judgment Matrix

Criterion Level	IP Popularity	Market Potential	Operation Team	IP Content
IP Popularity	1	2	4	1/5
Market Potential	1/2	1	4	1/3
Operation Team	1/4	1/4	1	6
IP Content	5	3	1/6	1

We directly quadrature each row element of the judgment matrix to the nth power:

$$W_i = \sqrt[n]{\prod_{j=1}^{n} a_{ij}} \quad i = 1,2,3, \ldots\ldots, n$$

W should be normalized again regardless of whether the sum or root method is used to assess the weight. The maximum eigenvalue λ_{max} of judgment matrix A can be approximately obtained using the following formula:

$$\lambda_{max} = \sum_{i=1}^{n} \frac{(AW_i)}{W_i} \Big/ n$$

(AW)i stands for the ith component of (AW).

Wa = 0.2394

= 0.2017

= 0.2763

= 0.2827

So W1 = 0.2394, W2 = 0.2017, W3 = 0.2763, and W4 = 0.2827.

Eigenvector Method

After the judgment matrix a = (aij)n*n is constructed, the maximum eigenvalue λ_{max} of A is calculated, and then the eigenvector W = (w1, w2, w3, ……, wn) is calculated by the eigenequation AW =λ_{max}W to then normalize the feature vector W. The normalized result shows the importance weight of each factor on the same level relative to a factor on

the previous level. This is a single-level level sorting process.

$$AW = \begin{bmatrix} 1 & 2 & 4 & 1/5 \\ 1/2 & 1 & 4 & 1/3 \\ 1/4 & 1/4 & 1 & 6 \\ 5 & 3 & 1/6 & 1 \end{bmatrix} (0.2394, 0.2017, 0.2763, 0.2827)$$

$$\lambda_{max} = \sum_{i=1}^{n} \frac{(AW_i)}{W_i} \Big/ n = 7.5382$$

Consistency Test

The weight value of each index is calculated using the geometric average method. We multiply elements of the judgment matrix from each line, and then open the product to the nth power, that is,

$$\overline{W}_i = \sqrt[n]{\prod_{i=1}^{n} f_{ij}} \quad (i = 1,2,3,\ldots, n)$$

After $\overline{W}_i$ was normalized, we can determine the eigenvector of judgment matrix W $= (W_1, W_2,\ldots, W_n)^T$

$$W_i = \frac{\overline{W}_i}{\sum_{i=1}^{n} \overline{W}_i} \quad (i = 1,2,3,\ldots, n)$$

Multiplying the eigenvector and the judgment matrix, the formula to get the maximum of value A λ_{max} is as follows:

$$\lambda_{max} = \sum_{i=1}^{n} \frac{(AW)_i}{nW_i}$$

(AW)i stands for the ith component of (AW).

By conducting a consistency test, AHP can calculate whether the weight value is reasonable. In general, if CR < 0.10, the evaluation result is credible; otherwise, it fails to pass the verification test and requires further correction. We can calculate and solve the

index CI of matrix consistency according to the following formula:

$$CI = (\lambda_{max}\text{-}n)/n{-}1$$

When the judgment matrix is completely consistent, CI is zero. The smaller the value of CI, the better the consistency of the judgment matrix. To ensure the satisfactory consistency of different order judgment matrices, the average random consistency index RI should be introduced. For the judgment matrix of order 1–9, the random consistency RI values are shown in the following table:

Table 4 Radom Consistency Test (RI) Table

n	1	2	3	4	5	6	7	8	9
RI	0	0	0.58	0.90	1.12	1.24	1.32	1.41	1.45

For the judgment matrix of order 1–9, when the matrix order is greater than or equal to 2, the ratio between the consistency index CI of the judgment matrix and the average random consistency index RI of the same order is called random CR, which is recorded as follows:

$$CR = CI/RI$$

After calculation, it was determined that the random CR of matrix A was within the acceptable range, and the consistency test results were consistent, as follows:

$$CI = (\lambda_{max}{-}n)/n{-}1 = 0.0897$$

This matrix CR = 0.0996 < 0.1, the inconsistency of judgment matrix A was within the acceptable range, which conforms to the consistency test.

Index Weight Calculation

After calculating the weights of the targets, the specific weight is summarized in Table 3 below. The weight on the four primary indexes, IP popularity, market potential, operation team, and IP content is 0.2394, 0.2017, 0.2763, and 0.2827, respectively.

Table 5 Primary Index Weight

	Primary Index	Weight
Evaluation	IP Popularity	0.2394
	Market Potential	0.2017
	Operation Team	0.2763
	IP Content	0.2827

IP Popularity

Building the Judgment Matrix

To further analyze the development of IP popularity, this paper invited 20 experts from the film and television industry to score the index. Combined with the experience of experts, the existing IP index were evaluated to further improve the rationality of the evaluation index. The formula is as follows:

Judgment Matrix

A	F1	F2	F3	…	Fn
F1	F11	F12	F13	…	F1n
F2	F21	F22	F23	…	F2n
F3	F31	F32	F33	…	F3n
…	…	…	…	…	…
Fn	Fn1	Fn2	Fn3	…	Fnn

Element Fij indicates the importance of element i compared with element j in the analysis of F. Furthermore, Fii = 1; Fij > 0; and Fij= 1/fji. The judgment scale was described according to the relative importance and the measurement value was 1–9. The judgment principle of the screenshot is as follows:

Judgment Scale Principle

Scale	Meaning
1	Experts believe that when i and j are compared, they are of the same importance
3	Experts think i is more important than j
5	Experts believe that i is obviously more important than j
7	Experts think i is very important compared to j
9	Experts believe that when i is compared to j, i is absolutely more importan
2, 4, 6,	Intermediate value status of the above scale description

According to the judgment matrix elements determined by experts, the element values are as follows:

Table 6 IP Popularity Judgment Matrix Table

IP Popularity	Popularity in Tieba	Topic Popularity
Popularity in Tieba	1	1/2
Topic Popularity	2	1

We directly quadrature each row element of the judgment matrix, and with the nth power, that is,

$$W_i = \sqrt[n]{\prod_{j=1}^{n} a_{ij}} \quad i = 1,2,3, \ \ldots\ldots, n,$$

W should be normalized again regardless of whether the sum or root method was used to assess weight. The maximum eigenvalue λ_{max} of judgment matrix A can be approximately obtained by the following formula:

$$\lambda_{max} = \sum_{i=1}^{n} \frac{(AW_i)}{W_i} \Big/ n$$

(AW)i stands for the ith component of (AW).

wa = 0.3333

= 0.6667

So W1 = 0.3333, W2 = 0.6667

Eigenvector Method

After judgment matrix A = $(a_{ij})n*n$ was constructed, the maximum eigenvalue of A was calculated, and then the eigenvector W = (w_1, w_2, w_3,……, w_n) was calculated by the eigenequation AW = $\lambda_{max}W$, and then to normalize the feature vector W. The normalized result indicates the importance weight of each factor on the same level relative to a factor on the previous level. This is a single-level level sorting process.

$$\lambda_{max} = \sum_{i=1}^{n} \frac{(AW_i)}{W_i} \Big/ n = 2$$

Consistency Test

① The weight value of each index was calculated using the geometric average method. We multiply the elements of each line of the judgment matrix and then with the nth power, that is,

$$\bar{W}_i = \sqrt[n]{\prod_{i=1}^{n} f_{ij}} \quad (i = 1,2,3,\ldots, n)$$

② After $\bar{W}_i$ was normalized, we determined the eigenvector of judgment matrix W = [W1, W2,…, Wn]T

$$W_i = \frac{\overline{W}_i}{\sum_{i=1}^{n} \overline{W}_i} \quad (i = 1,2,3,\ldots, n)$$

③ Multiplying the eigenvector and judgment matrix, the formula to obtain the maximum of value A λ_max is as follows:

$$\lambda_{max} = \sum_{i=1}^{n} \frac{(AW)_i}{nW_i}$$

(AW)i stands for the ith component of (AW).

Through a consistency test, AHP can calculate whether the weight value is reasonable. Generally, if CR < 0.10, the evaluation result is credible; otherwise, it fails to pass the verification test and requires further correction. We can calculate and solve the matrix consistency of index CI according to the following formula:

$$CI = (\lambda_{max} - n)/n - 1$$

When the judgment matrix is completely consistent, CI is zero. The smaller the value of CI, the better the consistency of the judgment matrix. To ensure the satisfactory consistency of different order judgment matrices, the average random consistency index RI should be introduced. For the judgment matrix of order 1–9, the random consistency RI values are shown in the following table:

Table 7 Random Consistency Test (RI) For IP Popularity Index

n	1	2	3	4	5	6	7	8	9
RI	0	0	0.58	0.90	1.12	1.24	1.32	1.41	1.45

For the judgment matrix of order 1–9, when the matrix order is greater than or equal to 2, the ratio between the CI of the judgment matrix and the average random consistency index RI of the same order is called random CR, which is recorded as follows:

$$CR = CI/RI$$

After calculation, it was determined that the random CR of matrix A was within the acceptable range, and the consistency test results were consistent, as follows:

$$CI = (\lambda_{max} - n)/n - 1 = 0$$

This matrix CR = 0 < 0.1 indicates that the inconsistency of judgment matrix A was within the acceptable range, which conforms to the consistency test.

Index Weight Calculation

As IP popularity has three layers of indexes, I present the specific weights in Table 4. The weight on the secondary indexes is 0.3333 and 0.6667 for popularity in Tieba and topic popularity, respectively. The weight on the tertiary indexes is 0.6267, 0.2797, and 0.0936 for popularity, content, and ambiance, respectively. The weight on the tertiary indexes is 0.3333 and 0.6667 for focus and users analysis, respectively.

Table 8 Index Weights of Each Level Under IP Popularity

Primary Index	Primary Index Weight	Secondary Index	Secondary Index Weight	Tertiary Index	Tertiary Index Weight
IP Popularity	0.2394	Popularity in Tieba	0.3333	Popularity in Tieba	0.6267
				Content in Tieba	0.2797
				Ambiance	0.0936
		Topic Popularity	0.6667	Focus	0.3333
				Users analysis	0.6667

Market Potential

Building a Judgment Matrix

To further analyze the development of market potential, this paper invited 20 experts from the film and television industry to score the index. Combined with the experience of industry experts, the existing IP index were evaluated by experts to further improve the rationality of the evaluation. The formula is as follows:

Judgment Matrix

A	F1	F2	F3	…	Fn
F1	F11	F12	F13	…	F1n
F2	F21	F22	F23	…	F2n
F3	F31	F32	F33	…	F3n
…	…	…	…	…	…
Fn	Fn1	Fn2	Fn3	…	Fnn

Element Fij indicates the importance of element i compared to element j in the analysis of F. Furthermore, Fii = 1; Fij > 0; and Fij = 1/fji. The judgment scale is described according to relative importance, and the measurement value is 1–9. The judgment principle of the screenshot is as follows:

Judgment Scale Principle

Scale	Meaning
1	Experts believe that when i and j are compared, they are of the same importance
3	Experts think i is more important than j
5	Experts believe that i is obviously more important than j
7	Experts think i is very important when compared to j
9	Experts believe that when i is compared to j, i is absolutely more importan
2, 4, 6,	Intermediate value status of the above scale description

According to the judgment matrix elements determined by experts, the element values are as follows:

Table 9 Market Potential Judgment Matrix Table

Market Potential	Fans of Authors	Fans of Actors	Search Volume	Click Volume	Download Volume	View Volume
Fans of Authors	1	1	1	4	2	1/2
Fans of Actors	1	1	2	4	1	1/2
Search Volume	1	1/2	1	5	3	1/2
Click Volume	1/4	1/4	1/5	1	1/3	1/3
Download Volume	1/2	1	1/3	3	1	1
View Volume	2	2	2	3	1	1

We directly quadrature each row element of the judgment matrix, and with the nth power, that is,

$$W_i = \sqrt[n]{\prod_{j=1}^{n} a_{ij}} \quad \text{i} = 1,2,3, \ \ \ldots\ldots, \text{n}$$

W should be normalized again regardless of whether the sum or root method was used to determine the weight. The maximum eigenvalue λ_{max} of judgment matrix A can be approximately obtained using the following formula:

$$\lambda_{max} = \sum_{i=1}^{n} \frac{(AW_i)}{W_i} \Big/ n$$

(AW)i stands for the ith component of (AW).

wa = 0.16

= 0.05

= 0.12

= 0.19

= 0.19

= 0.3

Eigenvector Method

After the judgment matrix A = (aij)n*n was constructed, the maximum eigenvalue of A was calculated, and then the eigenvector W = (w1, w2, w3,……, wn) was calculated by the eigenequation $AW = \lambda_{max} W$, and then to normalize the feature vector W. The normalized result indicates the importance weight of each factor in the same level relative to a factor in the previous level. This is a single-level level sorting process.

$$\lambda_{max} = \sum_{i=1}^{n} \frac{(AW_i)}{W_i} \Big/ n = 3.0246$$

Consistency Test

① The weight value of each index was calculated using the geometric average method. We multiplied the element of each line of the judgment matrix and then with the nth power, that is,

$$\overline{W}_i = \sqrt[n]{\prod_{i=1}^{n} f_{ij}} \quad (i = 1,2,3,\ldots, n)$$

② After W¯_i was normalized, we determined the eigenvector of judgment matrix W = [W1, W2,…, Wn]T

$$W_i = \frac{\overline{W}_i}{\sum_{i=1}^{n} \overline{W}_i} \quad (i = 1,2,3,\ldots, n)$$

③ Multiplying the eigenvector and judgment matrix, the formula to obtain the maximum of value A λ_max is as follows:

$$\lambda_{max} = \sum_{i=1}^{n} \frac{(AW)_i}{nW_i}$$

(AW)i stands for the ith component of (AW).

Through a consistency test, AHP can calculate whether the weight value is reasonable. Generally, if CR < 0.10, the evaluation result is credible; otherwise, it fails to pass the verification and requires further correction. The matrix consistency of the index CI can be calculated and solved using the following formula:

$$CI = (\lambda_{max}\text{-}n)/n{-}1$$

When the judgment matrix is completely consistent, CI is zero. The smaller the value of CI, the better the consistency of the judgment matrix. For the satisfactory consistency of different order judgment matrices, the average random consistency index RI should be introduced. For the judgment matrix of order 1–9, the random consistency RI values are presented in the following table:

Table 10 Random Consistency Test (RI) For Market Potential

n	1	2	3	4	5	6	7	8	9
RI	0	0	0.58	0.90	1.12	1.24	1.32	1.41	1.45

For the judgment matrix of order 1–9, when the matrix order is greater than or equal to 2, the ratio between the consistency of the judgment matrix index CI and the average random consistency index RI of the same order is called random CR, which is recorded as follows:

$$CR = CI/RI$$

After calculation, it was determined that the random CR of matrix A was within the acceptable range, and the consistency test results were consistent, as follows:

$$CI = (\lambda_{max}{-}n)/n{-}1 = 0.0678$$

This matrix CR = 0.0547 < 0.1; therefore, the inconsistency of matrix A was within the acceptable range, which conformed to the consistency test.

Index Weight Calculation

As there are three levels of market potential indexs, the calculation process was the

same as above.

The weight of the target was calculated as shown below in Table 5. The secondary indexes weight is 0.16 for fans of author, 0.05 for fans of actore, 0.12 for search volume, 0.19 for click volume, 0.19 for download volume, and 0.3 for view volume. And the tertiary index weight is 0.6667, and 0.3333 for new users and users actually using, of the author, 0.8571 and 0.1429 for the new users and users actually using, of the actor. The search volume, click volume, download volume, view volume is 1.

Table 11 The Weight Of Market Potential Index

Primary Index	Primary Index Weight	Secondary Index	Secondary Index Weight	Tertiary Index	Tertiary Index Weight
Market potential	0.2017	Fans of author	0.16	New users	0.6667
				Users actually using	0.3333
		Fans of actor	0.05	New users	0.8571
				Users actually using	0.1429
		Search volume	0.12	Search volume	1
		Click volume	0.19	Click volume	1
		Download volume	0.19	Download volume	1
		View volume	0.3	View volume	1

Operation Team

Building a Judgment Matrix

To further analyze the development of the operation team, this paper invited 20 experts from the film and television industry to score the index. Combined with the experience of industry experts, the existing IP index were evaluated by experts to further improve their rationality as follows:

Judgment Matrix

A	F1	F2	F3	…	Fn
F1	F11	F12	F13	…	F1n

F2	F21	F22	F23	…	F2n
F3	F31	F32	F33	…	F3n
…	…	…	…	…	…
Fn	Fn1	Fn2	Fn3	…	Fnn

Element Fij indicates the importance of element i compared with element j in the analysis of F. Furthermore, Fii = 1; Fij > 0; and Fij = 1/fji. The judgment scale is described according to relative importance, and the measurement value is 1–9. The judgment principle of the screenshot is as follows:

Judgment Scale Principle

Scale	Meaning
1	Experts believe that when i and j are compared, they are of the same importance
3	Experts think i is more important than j
5	Experts believe that i is obviously more important than j
7	Experts think i is very important when compared to j
9	Experts believe that when i is compared to j, i is absolutely more importan
2, 4, 6,	Intermediate value status of the above scale description

According to the judgment matrix elements determined by experts, the element values are as follows:

Table 12 Operation Team Index Judgment Matrix

Operation Team	Director	Screenwriter	Producer	Issuer
Director	1	2	4	1/5
Screenwriter	1/2	1	4	1/3
Producer	1/4	1/4	1	6
Issuer	5	3	1/6	1

We directly quadrature each row element of the judgment matrix and then with the nth power, that is,

$$W_i = \sqrt[n]{\prod_{j=1}^{n} a_{ij}} \quad i = 1,2,3,\ldots\ldots, n$$

W should be normalized again regardless of whether the sum method or root method was used to assess weight. The maximum eigenvalue λ_{max} of judgment matrix A can be approximately obtained using the following formula:

$$\lambda_{max} = \sum_{i=1}^{n} \frac{(AW_i)}{W_i} \Big/ n$$

(AW)i stands for the ith component of (AW).

wa = 0.2394

= 0.2017

= 0.2763

= 0.2827

So W1 = 0.2394, W2 = 0.2017, W3 = 0.2763, W4 = 0.2827.

Eigenvector Calculation

After the judgment matrix A = (aij)n*n was constructed, the maximum eigenvalue of A was calculated, and then the eigenvector W = (w1, w2, w3,……, wn) was calculated by the eigenequation $AW = \lambda_{max} W$, and then to normalize the feature vector W. The normalized result indicates the importance weight of each factor on the same level relative to a factor on the previous level. This is a single-level level sorting process.

$$AW = \begin{bmatrix} 1 & 2 & 4 & 1/5 \\ 1/2 & 1 & 4 & 1/3 \\ 1/4 & 1/4 & 1 & 6 \\ 5 & 3 & 1/6 & 1 \end{bmatrix} (0.2394, 0.2017, 0.2763, 0.2827)$$

$$\lambda_{max} = \sum_{i=1}^{n} \frac{(AW_i)}{W_i} \Big/ n = 7.5382$$

Consistency Test

① The weight value of each index is calculated using the geometric average method. We multiply the elements of each line of the judgment matrix and then with the nth power, that is,

$$\overline{W}_i = \sqrt[n]{\prod_{i=1}^{n} f_{ij}} \quad (i = 1,2,3,\ldots, n)$$

② After $\overline{W}_i$ was normalized, we could determine the eigenvector of judgment matrix W = [W1, W2,…, Wn]T

$$W_i = \frac{\overline{W}_i}{\sum_{i=1}^{n} \overline{W}_i} \quad (i = 1,2,3,\ldots, n)$$

③ Multiplying the eigenvector and judgment matrix, the formula to get the maximum of value A λ_{max} is as follows:

$$\lambda_{max} = \sum_{i=1}^{n} \frac{(AW)_i}{nW_i}$$

(AW)i stands for the ith component of (AW).

Through a consistency test, AHP can calculate whether the weight value is reasonable. Generally, if CR < 0.10, the evaluation result is credible; otherwise, it fails to pass the verification test and requires further correction. We can calculate and solve the matrix consistency of the CI index according to the following formula:

$$CI = (\lambda_{max} - n)/n - 1$$

When the judgment matrix is completely consistent, CI is zero. The smaller the value of CI, the better the consistency of the judgment matrix. To ensure the satisfactory consistency of different order judgment matrices, the average random consistency index RI should be introduced. For the judgment matrix of order 1–9, the random consistency RI values are shown in the following table:

Table 13 Random Consistency Test (RI) For Operation Team

n	1	2	3	4	5	6	7	8	9
RI	0	0	0.58	0.90	1.12	1.24	1.32	1.41	1.45

For the judgment matrix of order 1–9, when the matrix order is greater than or equal to 2, the ratio between the consistency of the judgment matrix CI index and the average random consistency RI index of the same order is called random CR, which is recorded as follows:

$$CR = CI/RI$$

After calculation, it was determined that the random CR of matrix A was within the acceptable range, and the consistency test results were consistent, as follows:

$$CI = (\lambda_{max} - n)/n - 1 = 0.0897$$

This matrix CR = 0.0996 < 0.1, indicated that the inconsistency of matrix A was within the acceptable range and was consistent with the consistency test.

Index Weight Calculation

The weight of the target was calculated, and reported below in Table 6. The secondary indexes weight is 0.2394, 0.2017, 0.2763, and 0.2827 for directors, screenwriter, producer and issuer respectively. And the tertiary index weight is 0.6267, 0.2797, and 0.0936 for responsibility, popularity and professionalism of directors , the 0.5695, 0.3331 and 0.0974 for responsibility, popularity and professionalism of writer. Financial support, embedded advertising revenue plan and promotion plan is 0.2797. 0.0936 and 0.6267 respectively. And the issuance plan, fund and chaneel is 0.0974, 0.3331 and 0.5695.

Table 14 The Weight of Operation Team

Primary Index	Primary Index Weight	Secondary Index	Secondary Index Weight	Tertiary Index	Tertiary Index Weight
Operation team	0.2763	Directors	0.2394	Responsibility	0.6267
				Popularity	0.2797
				Professionalism	0.0936
		Screen-writer	0.2017	Responsibility	0.5695
				Popularity	0.3331
				Professionalism	0.0974
		Producer	0.2763	Financial support	0.2797
				Embedded advertising revenue plan	0.0936
				Promotion plan	0.6267
		Issuer	0.2827	Issuance plan	0.0974
				Issuance fund	0.3331
				Issuance channel	0.5695

IP Content

Building a Judgment Matrix

To further analyze the development of IP content, this paper invited 20 experts from the film and television industry to score. Combined with the experience of industry experts,

the existing IP index were evaluated by experts to further improve their rationality. The formula is as follows:

Judgment Matrix

A	F1	F2	F3	…	Fn
F1	F11	F12	F13	…	F1n
F2	F21	F22	F23	…	F2n
F3	F31	F32	F33	…	F3n
…	…	…	…	…	…
Fn	Fn1	Fn2	Fn3	…	Fnn

Element Fij indicates the importance of element i compared with element j in the analysis of F. Furthermore, Fii = 1; Fij > 0; and Fij = 1/fji. The judgment scale is described according to relative importance, and the measurement value is 1–9. The judgment principle screenshot is as follows:

Judgment Scale Principle

Scale	Meaning
1	Experts believe that when i and j are compared, they are of the same importance
3	Experts think i is more important than j
5	Experts believe that i is obviously more important than j
7	Experts think i is very important when compared to j
9	Experts believe that when i is compared to j, i is absolutely more importan
2, 4, 6,	Intermediate value status of the above scale description

According to the judgment matrix elements determined by the experts, the element values are as follows:

Table 15 IP content judgment matrix

IP Content	Theme	Plot
Theme	1	6
Plot	1/6	1

We directly quadrature each row element of the judgment matrix and then open the nth power, that is,

$$W_i = \sqrt[n]{\prod_{j=1}^{n} a_{ij}} \quad i = 1,2,3, \ldots\ldots, n$$

W should be normalized again regardless of whether the sum or root method is used to assess weight. The maximum eigenvalue of judgment matrix A can be approximately obtained using the following formula:

$$\lambda_{max} = \sum_{i=1}^{n} \frac{(AW_i)}{W_i} \Big/ n$$

(AW)i stands for the ith component of (AW).

wa = 0.8571

= 0.1429

Eigenvector Calculation

After the judgment matrix A = (aij)n*n was constructed, the maximum eigenvalue of A was calculated, and then the eigenvector W = (w1, w2, w3,……, wn) was calculated by the eigenequation AW =λ_{max}W, and then the feature vector W normalized. The normalized result indicates the importance weight of each factor on the same level relative to a factor on the previous level. This is a single-level level sorting process.

$$\lambda_{max} = \sum_{i=1}^{n} \frac{(AW_i)}{W_i} \Big/ n = 2$$

Consistency Test

① The weight value of each index was calculated using the geometric average method. We multiplied the elements of each line of the judgment matrix and then with the nth power, that is,

$$\overline{W}_i = \sqrt[n]{\prod_{i=1}^{n} f_{ij}} \quad (i = 1,2,3,\ldots, n)$$

② After $\overline{W}_i$ was normalized, we could determine the eigenvector of the judgment matrix W = [W1, W2,…, Wn]T

$$W_i = \frac{\overline{W}_i}{\sum_{i=1}^{n} \overline{W}_i} \quad (i = 1,2,3,\ldots, n)$$

③ Multiplying the eigenvector and judgment matrix, the formula to get the maximum value λ_{max} of A is as follows:

$$\lambda_{max} = \sum_{i=1}^{n} \frac{(AW)_i}{nW_i}$$

(AW)i stands for the ith component of (AW).

Through a consistency test, AHP can calculate whether the weight value is reasonable. Generally, if CR < 0.10, the evaluation result is credible; otherwise, it has failed to pass the verification test and requires further correction. According to the following formula, we can calculate and solve the matrix consistency using the CI index:

$$CI = (\lambda_{max} - n)/n - 1$$

When the judgment matrix is completely consistent, CI is zero. The smaller the value of CI, the better the consistency of the judgment matrix. To ensure the satisfactory consistency of different order judgment matrices, the average random consistency index RI should be introduced. For the judgment matrix of order 1–9, the random consistency RI

values are shown in the following table.

Table 16 Random Consistency Test (RI) For IP Content

n	1	2	3	4	5	6	7	8	9
RI	0	0	0.58	0.90	1.12	1.24	1.32	1.41	1.45

For the judgment matrix of order 1–9, when the matrix order is greater than or equal to 2, the ratio between the consistency index CI of the judgment matrix and the average random consistency index RI of the same order is called random CR, which is recorded as follows:

$$CR = CI/RI$$

After calculation, it was determined that the random CR of matrix A was within the acceptable range, and the consistency test results were consistent, as follows:

$$CI = (\lambda_{max} - n)/n - 1 = 0$$

This matrix CR = 0 < 0.1; therefore, the inconsistency of matrix A was within the acceptable range, which conforms to the consistency test.

Index Weight Calculation

I calculated the weight of the target, as shown in Table 7. The secondary indexes weight is 0.8571 for theme, the 0.1429 for plot. And the tertiary index weight is 0.8571 for novelty, 0.1429 for whether hot issues. And Narratie style is 0.263, details description is 0.475, characteristics is 0.055, theme connotation is 0.099, structure relation is 0.11.

Table 17 The Weight of IP Content

Primary Index	Primary Inde Weight	Secondary Index	Secondary Index Weight	Tertiary Index	Tertiary Index Weight
IP content	0.2827	Theme	0.8571	Novelty	0.8571
				Whether hot issues	0.1429
		Plot	0.1429	Narrative style	0.263
				Details description	0.475
				Characteristics	0.055
				Theme connotation	0.099
				Structure relation	0.11

Finally I take into account the weights on the primary, secondary, and tertiary index, then compute the final weight for each evaluation index. The results are reported in Table 8. These final weights will help researchers to compute an overall valuation score for each IP drama based on its individual score of each of the 32 three tier indexes.

Table 18 Overall Score of Each Factor

	Primary Index	Primary Index Weight	Secondary Ind	Secondary In Weight	Tertiary Index	Tertiary Inde Weight	Final weight
Evaluation	IP popularity	0.239	Popularity Tieba	0.333	Popularity in Tieba	0.627	0.050
					Content in Tieba	0.280	0.022
					Ambiance	0.094	0.007
			Topic popularit	0.667	Focus	0.333	0.053
					Users analysis	0.667	0.106
	Market potential	0.202	Fans of authors	0.160	New users	0.667	0.022
					Users actually using	0.333	0.011
			Fans of actors	0.050	New users	0.857	0.009
					Users actually using	0.143	0.001
			Search volume	0.120	Search volume	1.000	0.024
			Click volume	0.190	Click volume	1.000	0.038
			Download volu	0.190	Download volume	1.000	0.038
			View volume	0.300	View volume	1.000	0.061
	Operation team	0.276	Directors	0.239	Responsi-bility	0.627	0.041
					Popularity	0.280	0.019
					Profession-alism	0.094	0.006
			Screenwriter	0.202	Responsibility	0.570	0.032
					Popularity	0.333	0.019
					Profession-alism	0.097	0.005
			Producer	0.276	Financial support	0.280	0.021
					Embedded adverti revenue plan	0.094	0.007
					Promotion plan	0.627	0.048
			Issuer	0.283	Issuance plan	0.097	0.008
					Issuance fund	0.333	0.026
					Issuance channel	0.570	0.044
	IP content	0.283	Theme	0.857	Novelty	0.857	0.208
					Whether hot issues	0.143	0.035
			Plot	0.143	Narrative style	0.263	0.011
					Details description	0.475	0.019
					Character-istics	0.055	0.002
					Theme connotation	0.099	0.004
					Structure relation	0.110	0.004

CHAPTER 5

CASE ANALYSIS

To test the validity of the model, the data of 13 IP rewriters were extracted and fed into the model for analysis. After quantifying 32 tertiary indexes, the specific scores were obtained and the final comprehensive scores were calculated using the final weights as shown in Table 8. The overall score of each IP dramas is shown below in Table 9. Among them, Day and Night ranked first with a score of 92.080, Sha Hai followed closely with a score of 90.113, and The Journey of Flower and The Beloved Princess of Two Centuries ranked third and fourth with 89.209 and 89.003, respectively. The adapted TV tomb-robbing series Candle in the Tomb and The Lost Tomb rank sixth and seventh.

Table 19 The Final Score for Each IP Drama

Evaluation		1	2	3	4	5	6	7	8	9	10	11	12	13
Tertiary Indicators	Final weight	Score	Score	Score	Score	Score	Score	Score	Score	Score	Score	Score	Score	Score
Popularity in Tieba	0.050	99	100	100	100	100	100	100	100	100	45	56	56	46
Content in Tieba	0.022	45	56	46	58	96	79	95	87	97	67	97	94	93
Ambiance	0.007	67	94	93	94	96	96	79	89	97	100	98	97	97
Focus	0.053	98	87	100	100	100	100	100	100	100	100	45	56	56
Users analysis	0.106	97	98	99	87	100	100	100	100	100	100	100	100	45
New users	0.022	56	46	58	96	79	95	87	97	67	97	94	93	94
Users actually using	0.011	79	87	97	67	97	94	93	94	96	96	79	89	97
New users	0.009	87	67	97	94	93	94	96	96	79	89	97	100	98
Users actually using	0.001	79	97	98	100	96	96	95	87	95	93	84	94	88
Search volume	0.024	100	56	56	46	58	96	79	95	87	97	67	97	94
Click volume	0.038	100	100	100	100	100	45	56	56	46	58	96	79	95
Download volume	0.038	100	100	100	100	45	56	56	46	58	96	79	95	87
View volume	0.061	87	99	87	100	100	100	100	100	100	100	100	45	56
Responsibility	0.041	100	100	100	100	100	100	45	56	56	46	58	96	79
Popularity	0.019	96	95	87	97	67	97	94	93	94	96	96	79	89
Professionalism	0.006	94	94	96	96	79	89	97	100	98	97	97	97	97
Responsibility	0.032	100	100	45	56	56	46	58	96	79	95	87	97	67
Popularity	0.019	58	79	95	87	97	67	97	94	93	94	96	96	79
Professionalism	0.005	93	96	96	79	89	97	100	98	97	97	97	97	94
Financial support	0.021	56	58	96	79	95	87	97	67	97	94	93	94	96
bedded advertising revenue	0.007	97	93	94	96	96	79	89	97	100	98	97	97	97
Promotion plan	0.048	87	100	100	100	100	100	100	100	45	56	56	46	58
Issuance plan	0.008	97	97	94	93	94	96	96	79	89	97	100	98	97
Issuance fund	0.026	100	45	56	56	46	58	96	79	95	87	97	67	97
Issuance channel	0.044	100	100	100	100	100	100	100	45	56	56	46	58	96
novelty	0.208	98	89	88	93	90	87	84	81	78	75	72	69	66
Whether hot issues	0.035	100	100	100	45	56	56	46	58	96	79	95	87	97
Narrative style	0.011	95	97	67	97	94	93	94	96	96	79	89	97	100
Details description	0.019	46	96	79	95	87	97	67	97	94	93	94	96	96
Characteristics	0.002	96	89	97	100	98	97	97	97	97	94	92	94	92
Theme connotation	0.004	96	79	89	97	100	98	97	97	97	97	94	92	94
Structure relation	0.004	94	96	79	89	97	100	98	97	97	97	97	94	92
		92.080	90.113	89.209	89.003	88.659	87.216	85.684	84.178	82.674	81.189	79.486	77.548	73.180

No.	Name
1	Day and Night
2	Shahai
3	The Journey of Flower 2015
4	The Beloved Princess of two Centuries
5	Growling Tiger and Roaring Dragon
6	Candle in the Tomb
7	The Lost Tomb
8	Go Princess Go
9	Guardian
10	The Beloved Princess of two Centuries 2
11	The Street of Guardian
12	KO One 4
13	The King's Avatar

Matching Degree Test

As aforementioned, the value of IP dramas includes the development of TV series, derivative games, and the sale of themed derivatives. However, research has revealed that

current mainstream IP development mainly includes two aspects: TV series development and derivative games. Other derivative categories are extremely small and can generally be ignored. As not all of the selected episodes in this article have developed related games, to check the effectiveness of the model, we tested it in two parts. The first part simply verified the relationship between the model score and broadcast viewership. Table 10 reports the total broadcast volume of each of the 13 IP shows from 2017 to 2019, intercepted from the Yien database. In the second part, I examined the association between the valuation scores and the number of game downloads for the IP episodes containing games. However, because not all the dramas had been adapted for games, we selected nine shows that contain games for the analysis. The game download data was collected from Baidu and Huawei App Market.

Table 20 Broadcast Viewers and Game Downloads of 13 IP Dramas

Name of Drama	Score	Broadcast Volume (Billion)	Game download volume (million)
Day and Night	92.08	61.6	/
Shahai	90.113	63.9	/
The Journey of Flower	89.209	134.4	9.31
The Beloved Princess of two Centuries	89.003	55.2	0.04
Growling Tiger and Roaring Dragon	88.659	49.3	3.42
Candle in the Tomb	87.216	49.5	2.82
The Lost Tomb	85.684	45.5	2.37
Go Princess Go	84.178	42.8	/
The Guardian	82.674	36.9	/
The Beloved Princess of two Centuries 2	81.189	39.7	0.88
The Street of Guardian	79.486	35.7	1.63
KO One 4	77.548	20.8	0.98
The King's Avatar	73.18	37.8	1.14

The Correlation Between the Model Score and Broadcast Viewers

Both the model score and broadcast viewership can be regarded as continuous variables; hence, the Pearson correlation analysis between two variables was performed with the results presented in Table 11 below.

Table 21 Correlation Between Score and Broadcasting Viewership

		Score	Broadcast Volume
Score	Pearson correlation	1	0.572
	P-value (two-tail test)		0.041
	N	13	13
Broadcast Viewers	Pearson correlation	0.572	1
	P-value (two-tail test)	0.041	
	N	13	13

As shown in Table 11, the Pearson correlation coefficient was 0.572, which is positive and statistically significant at a 5% level. This suggests that the score and broadcast viewership had a significant positive correlation (r = 0.572), that is, the higher the play's score, the larger the number of broadcast viewers.

Correlations Between the Score, Broadcast Viewership, and Game Downloads

Similarly, the shows' viewers and the number of game downloads were collected. A Pearson correlation analysis was conducted to analyze the correlation between the score, number of viewers, and number of downloads, with the results listed in Table 12 below.

Table 22 Correlations Between Score, Broadcast Viewers, and Game Downloads

		Score	Broadcast Viewers	Game Downloads
Score	Pearson correlation	1	0.579	0.477
	P-value (two-tail test)		0.102	0.194
	N	9	9	9
Broadcast Viewers	Pearson correlation	0.579	1	0.908
	P-value (two-tail test)	0.102		0.001
	N	9	9	9
Game Downloads	Pearson correlation	0.477	0.908	1
	P-value (two-tail test)	0.194	0.001	
	N	9	9	9

Table 12 indicates that the Pearson correlation coefficient between the score and number of game downloads was 0.477; however, this is not statistically significant as the P-value was 0.194. This indicates that there was no significant correlation between the score and the game downloads.

In the second section, the limited sample data could not fully reflect the correlations between the score, broadcast viewers, and the number of downloads of games. Nevertheless, a significant positive correlation between the number of broadcast viewers and the game downloads was confirmed. Combining it with the conclusion of the first section, we analogized that if a high score meant high ratings, then the number of downloads of the corresponding game would also be high, which indicates a high value of drama. With the future perfection of the IP drama development system, we will obtain more data to improve the comprehensiveness and accuracy of our conclusions.

CHAPTER 6

CONCLUSIONS AND SUGGESTIONS

Conclusions

This research found that the AHP model can reasonably evaluate the copyright value of IP dramas through four primary index: IP popularity, market potential, operation team, and IP content. The model also used 14 secondary index, including popularity in Tieba, topic popularity, fans of authors, fans of actors, search volume, click volume, download volume, view volume, director, screenwriter, producer, issuer, theme, and plot, and 32 third-level index. Therefore, we can analyze and evaluate an IP show, form a reasonable data evaluation system for the IP show, calculate a reasonable price of the IP show's copyright value, assist in investment decision-making, and promote the development of the industry.

This research revealed that the factors affecting the value of an IP drama can be summed up in three points, namely, the content of the IP drama, development of IP, and transformation of IP traffic. Generally, the novelty of the theme content of the IP drama is the primary internal driving element of IP value. If the content is to win the loyalty of the audience, it needs to have a certain degree of novelty or creativity. When themes are repeated in the market, the homogenization trend is obvious; without something original to captivate the viewers, the audience does not have sufficient reason to pay for it. However, it is not easy to be innovative and creative in content. This is also a big problem in the IP network drama industry where choosing a novel theme or role implies taking risks. There is never a guarantee that novel content will be sufficiently loved by the audience for investors or producers to choose a play with a huge investment and the risk of an unknown outcome. Therefore, they will generally choose to invest in the formula of homogeneity and repetition of dramas with the expected returns. Thus, television broadcast content falls

into a cycle. How to break the cycle, how to innovate with IP content, and how to maximize the value of content are the primary issues to be considered in the future development of IP network drama.

Another factor that affects the value of IP dramas is the publicity and development of the show. The Internet is the most important development of this era, and the popularity of IP shows can thus never be separated from the role of the Internet. Fully integrating online and offline publicity resources and making the marketing of IP show brands as a whole will help promote IP value. In developed countries, consumers always pay attention to a product's image and believe a brand has a unique value; therefore, they are better at integrating content resources into a whole brand to generate brand value. Taking Disney as an example, although it only engaged in animation creation at first, it has developed into various types of derivatives based on the image of its own animated characters and has become a large multinational company integrating animation production, theme parks, books, games, etc. China's domestic IP development is more decentralized with poor integration of resources that tends to focus on the transaction price without sufficient attention paid to the production company's own level, which results in the uneven development of IP products. It is difficult to produce linkage effects to create a comprehensive brand and improve the value of IP.

The last point is about IP traffic transformation. Simply speaking, IP shows with high-quality production levels and specialized operations can attract more audience groups and maximize IP value. The IP production process involves transforming concepts into real products to meet consumer needs. This process is the key factor for determining product quality, and quality is crucial for IP to succeed. This also determines whether IP can generate and sustain market benefits. For example, although the popular IP play The Lost Tomb attracted a large audience and ranked in the forefront of broadcast viewership, it

scored only 4.7 points on Douban. In contrast, Langya Bang, another popular IP show, scored as high as 9.3 points. As the IP was adapted from the same novel, the former relied on a larger number of female readers than the latter, which only relied on content to attract readers. The primary reason for this result was the poor production quality of the TV series that resulted in a large fan loss, and the high-quality transformation of IP traffic was not realized. The quality of IP production greatly impacts the performance of the IP market and the transformation of IP value. High-quality productions mean high, long-term profits. Second, post-production is also important. IP is the product of the development of the pan entertainment industry, and promoting cross-domain development is important for realizing the value of IP. The formulation of a marketing plan, the improvement and strengthening of the IP drama in its mature period, and the linkage of derivatives all play a significant role in promoting the value of IP dramas. The maintenance of fans during the mature stage is an effective way of mainlining the audience's base, such as the official micro-blog and public numbers, regular online interaction of fans, and steady upgrading of derivatives. This has laid a solid foundation for the return of long-term profits of IP series.

Research Limitations

In this paper, the model was verified using broadcast viewership and game downloads. The number of broadcast viewers can be captured as most IP dramas are pay-per-view, or purchased through membership of a video site, such that the number of viewers equals the value of the IP drama in the ratings. In contrast, not all IP dramas have developed games, so we tested those that had developed games individually. However, the value of the IP dramas could include more aspects such as the profit of derivative games and souvenirs with the development of this industry. Thus, this model should reconsider the total value of "big IP." More cases are required to test the model's value.

In addition, in this paper, it only discuss and study the IP dramas, but do not discuss

whether the value analysis model has the same effect on the adaptation of IP films. At present, because the Chinese film box office data has a certain degree of opacity and artificial operation, which can not really reflect the content quality and popularity of the film. Therefore, there is no research on IP films in this paper, but I believe that with the development of Chinese film industry and the improvement of industry system, the film box office will more truly reflect the quality and popularity of films. At that time, we can analyze the value of IP films again, in order to enrich our model conclusions and applications.

Suggestions

Given the emerging IP adaptation drama industry, the systematic evaluation of IP resource value is not perfect, and the current evaluation method still has its limitations and deficiencies. Similar to other evaluation models, to ensure the clarity of the model, various complex relationships in the real world were simplified as much as possible, that is, some important factors were ignored. For example, the audience's recognition of IP content is highly personalized, with different opinions held by different people. Data can only represent a quantifiable trend or a simple number, but in real life, the impact of fluctuations in personal emotions is far higher than expected. Second, with the current development of China's film and television industry, the impact of policy fluctuations on a show is often fatal. Finally, because the current evaluation of IP value is not systematic, the existing methods are not mature enough. In the future, a large amount of data will be needed for training, and in many cases it will be necessary to correct errors and gradually improve its accuracy, effectiveness, and predictive ability to help investors and industry professionals obtain higher value returns.

REFERENCES

Anson, W., Noble, D., & Samala, J. (2014). IP valuation: what methods are used to value intellectual property and intangible assets. **The Licensing Journal**, 34(2): 1-5.

Berinde, M., & Petrica, D. (2015). International litigation damages including intangible assets value. **The Annals of the University of Oradea**, 651.

Chen, S. (2016). Survey of IP publishing—Integration of popular culture, fan economy and media. **Publishing Research**, (09).

Chen, Z. (2004). Performance evaluation model and algorithm of supply and demand coordination based on ANP Theory. **Computer Integrated Manufacturing Systems**, (10).

Dong, Y., & Chen, Y. (2006). Comparison of technological innovation ability between the east and the west of China based on ANP. **Practice and Understanding of Mathematics**, (36).

Gao, X. (2018). Research on IP development mode of network literature under pan entertainment business mode, a study of communication strength.

Goldheim, D., Slowinski, G., Daniele, J., Hummel, E., & Tao, J. (2005). Extracting value from intellectual assets. **Research Technology Management**, 48(2): 43-48.

Gong, K. (2017). On the evaluation of China's IP (intellectual property rights)—Taking the adaptation right of online literature, film and television as an example. **Taxes**, (04).

He, Z., Sun, L., & Gong, J. (2006). Analytic network process and application for member selection in logistics alliance. **China Mechanical Engineering**, 17(18): 1913-1915.

Hong, G. (2016). Evaluation and development of IP value of M company's network literature in the context of pan entertainment.

IResearch. (2019). China literature IP pan entertainment development report.

Jian, P., Xia, J., & Lin, J. (2004). The application of the ANP Method in the adjustment of

the strategic system of the sustainable development of the western region. **Practice and Understanding of Mathematics**, (34).

Jiang, X., & Wang, L. (2016). Research on IP operation mode in Pan entertainment environment, **Science and Technology and Publishing**, (05).

Katarzyna, K., & Mateusz, K. (2014). Non-liner corrections in market method patent valuation. **Peer-reviewed and Open Access Journal**, (10).

Li, C. (2010). The application of media economics in the production of film and television works, taking real animation as an example. **News Enthusiasts**, (02).

Li, D. (2015). Analyzing the IP value of Internet literature in the context of pan entertainment. **News and Communication**, 24.

Li, J., Li, X., & Yuan, X. (2016). The value composition of high-quality IP in the pan entertainment media environment. **Media Wide Angle**, 11(I): 69-71.

Li, Y. (2007). Research on risk analysis method of hydropower project based on network analysis method (ANP), school of construction engineering. Tianjin: Tianjin University.

Lianfen, W., & Shubai, X. (1990). Introduction to AHP. Beijing: China Renmin University Press.

Liu, H. (2006). Research on government performance evaluation based on a network analytic hierarchy process. **Science and Technology Management**, (27).

Liu, Z. (2017). Reconstruction: Three modes of IP development. **Friends of Editors**, (09).

Michael, J. P. (2009). Key questions to help IP analysts choose the right valuation method, **Business Valuation Update**, (01).

Pan, Y., Qiang, D., & Yaping W. (2014). Research on financing mode and efficiency of cultural entrepreneurship industry based on data envelopment analysis. **China Soft Science**, (03).

Peng, K. (2015). IP development and operation mechanism of Hollywood films. **Contemporary Films**, (09).

Reilly, R. F. (2009) Valuation of IP during a distressed economy. **The Licensing Journal**, 09.

Saaty, T. L. (1990). Multicriteria decision making. Pittsburgh, PA: RWS Publications.

Saaty, T. L. (1991). Inner and outer dependence in the analytic hierarchy process: The supermatrix and superhierarchy. Proceeding of the 2nd ISAHP. Pittsburgh, PA.

Saaty, T. L. (1996). Decision making with dependence and feedback. Pittsburgh, PA: RWS Publication.

Sakis, J. (1998). Evaluation environmentally conscious business practices. **European Journal of Operational Research**, (107).

Sakis, J. (2003). Qualitative models for performance measure systems-alternate considerations, **Production Economics**, (86).

Shen, S., Meng, J., & Mai, X. (2014) Talk about IP Investment: The value of the bright moon in Qin Dynasty has increased ten times. https://www.woyoo.com/chanye/13507.html

Su, Y., & Liu, Y. (2006). Technology innovation risk assessment and technology management research based on ANP networked manufacturing environment, **Research on Science and Technology Management**, (26).

Wandtick, D. (2012). Costs of capital: You can love more than just one. **Business Valuation Update**, (12).

Wang, J. (2016). Research on influencing factors of network drama value evaluation from the perspective of IP. **Journal of Ocean University of China (Social Sciences Edition)**, 5: 87-95.

Wang, L. (2011). Theory and algorithm of ANP. Theory and practice of system engineering,

03.

Wei, M., & Chen, Y. (2006). Research on the evaluation system of technological innovation ability of enterprises based on ANP. **Research on Scientific and Technological Management**, (26).

Xiang, Y., & Bai, X. (2016). Cross-border development strategy of Internet literature IP value. **Modern Communication**, (38).

Xiong, S., Yi, S., & Tang, P. (2006). Relationship management and evaluation of auto parts suppliers based on ANP. **Journal of Chongqing University: Natural Science**, (29).

Xue, B., Wang, J., & Liu, C. (2006). Dynamic evaluation of green supply chain management based on ANP, **Information Magazine**, (25).

Yang, L. (2015). Dissertation: Film and television copyright pledge evaluation research. Shandong University of Finance and Economics.

Yu, M. (2011). Seeing the construction of entertainment brand industry chain based on Harry Potter's success. **Business Culture Monthly**, pp.09.

Zeng, Y. (2017). Dissertation: Film and television copyright evaluation. Jinan University.

Zhang, L., & Li, Y. (2017). Research on fans' value transformation of cross media IP works. **News Dissemination**, (01).

Zhang, Y. (2014). The construction of the value development model of China's film and television works—Take "you from the stars" as an example in China, (04).

Zhanghong, Q. (2017). The value evaluation of film IP resources. **Contemporary Film**, (9).

Zhao, K., Huang, L., & Sun, H. (2005). Project selection model of information system based on strategic competitive advantage. **Journal of Systems Engineering**, 20.

Zhou, T. (2015).What exactly is the "IP" that is popular in Chinese film and television circle. http://cul.sohu.com/20150625/n415609856.shtml

Zhu, H. (2018). Network drama appears frequently, IP is still the king? New three board strategy report of Anxin securities.

Zou, Y. (2017). Research on the communication characteristics of Internet IP film and television works under the “5W” mode, a study of communication power, (1).

APPENDIX

Below is a list of 20 experts from the film and television industry.

Name	Brief introduction.
Nancy Hai	Television director of China Central Television
Xin Wang	Actor
Rui Ma	Actress; representative work: To the Sky Kingdom
Baoxin Yang	Actor, Singer
Geyang Li	Actor, Singer
Xiaojun Zhang	CEO of China's famous entertainment company
Zheng Liu	Famous agent, investor
Yang Lu	Famous film producer
Zhenghu Li	Playwright
Yang Zhang	Playwright
Yiming Sun	Playwright
Li Mi	Director
Yanzhang Jiang	Investor
Geng Han	Famous actor, singer
Jingyu Huang	Most popular actor
David Han	Investor
David Zhu	Investor
Dongyu Fu	Director
Zheng Yu	Famous IP Drama director