

Research on Urban Development under the Background of Online Red Economy

Weijia Zeng^a, Fang Qin^{b,*}, Lin Li^c, Nan Bai^d

School of Information Science and Technology, Dalian University of Science and Technology, Dalian, Liaoning, China

^azengweijia@dlust.edu.cn, ^bqinfang@dlust.edu.cn, ^clilin0628@dlust.edu.cn, ^dbainan@dlust.edu.cn

*Corresponding author

Abstract: Online red economy is a new model of economic development in recent years, which is increasingly valued and favored by various countries and regions. Taking Dalian City of Liaoning Province as an example, this paper discusses the mechanism of integrated development of Internet celebrity economy and city based on literature review, constructs the measurement model of Internet celebrity base in Dalian City through three index systems of economy, industry and development, and studies the influence of the proportion of industrial personnel on industrial performance level. From the aspects of promoting the integration of Internet celebrity economy and tourism industry, improving the policy environment and system mechanism, and establishing the supervision system, this paper puts forward the countermeasures to promote the transformation and upgrading of the city's integrated development industry.

Keywords: Internet celebrity Economy, Internet Celebrity Base, Urban Coordinated Development, Industrial Transformation and Upgrading

1. Introduction

Internet celebrity economy is a new economic model emerging in recent years. With the development and popularization of new technologies such as the Internet, 5G, big data and block chain, Internet celebrity economy has gradually become a new engine to boost high-quality economic development. According to the "In-depth Analysis and Development Prospect Forecast Report of China's Live Streaming E-commerce Industry in 2022-2027" [1], a research and consulting report by Priceprice of China Research & Development, it is estimated that the compound annual growth rate of live streaming e-commerce market in the next three years will be 58.3%, and the scale of live streaming e-commerce will exceed 4.9 trillion yuan in 2023 [2].

2. Literature Review

2.1. Internet Celebrity and Internet Celebrity Economy

Internet celebrity and Internet celebrity economy is a new business form and model produced in the digital age. Internet celebrity is the Internet celebrity, this product of the era in the context of the rapid development of the Internet and the digital era because of its influence in the field of consumption has attracted much attention. Internet celebrities become popular by attracting a large number of fans' attention through interaction with Internet users, including content Internet celebrities, event Internet celebrities, Weibo Internet celebrities, e-sports Internet celebrities, involving food fashion education, photography and many other fields [3-4].

Internet celebrity economy is a kind of commercial marketing model, Internet celebrities through their own public influence and behind the company, interest groups and other operators and certain marketing means, through the influence of fans' values, lifestyle, and so on, so as to derive actual interests and economic effects [5].

2.2. Internet Celebrity Base and Urban Integration Development

The birth of the Internet celebrity base indicates that the Internet celebrity economy has stepped on

the fast track of development. According to the actual situation of urban development in our country, problems such as the gradual reduction of population, the hollowing out of industry and the lack of financial capacity are the key issues that restrict the development of small and medium-sized cities. Internet red economy provides a new way to improve the quality of urban development and promote economic development. Moreover, the "enterprise-level understanding" of urban culture and governance is deconstructed from the perspective of Internet celebrity economy: high-quality urban development, people first, scientific development and word-of-mouth is king. From the perspective of empirical analysis, the new business forms and models of digital economy represented by Internet celebrity economy have supported the rapid development of new consumption against the trend, promoted economic growth and enhanced regional innovation ability [6-7].

In summary, under the background of Internet celebrity economy, the role of Internet celebrity base in urban development and industrial transformation and upgrading is realized through the production chain of Internet celebrity economy. Specifically, the Internet celebrity base drives economic development through talent mining and training, skill training of Internet celebrity training academy, advertising production agency, online celebrity product live delivery supply chain, professional business services, professional skill training and high-quality content development, which further optimizes the urban industrial layout and promotes the deep integration of digital economy and real economy. We have achieved high-quality urban development and industrial transformation and upgrading. This process is influenced by internal and external environment, involving many aspects such as funds, policies, talents, institutions and mechanisms.

3. Model Based Analysis of the Feasibility of Building an Online Celebrity Base in Dalian

3.1. Index System Selection

According to the mechanism of the integration of online celebrity economy and urban development, this paper analyses the feasibility of building an online celebrity base in Dalian. Based on the actual situation of Dalian, it follows the principles of scientific, representative, intuitive and data availability in the selection of specific indicators to build an indicator system for the role of online celebrity base industrial development and urban development. The most direct effect of building an online celebrity base is to drive economic growth, promote employment and industrial transformation and upgrading, so as to further promote urban development. Therefore, the measurement index system of building an online celebrity base in Dalian to promote the development of online celebrity economy and industry can be divided into three first level indicators and five second level indicators, as shown in Table 1.

Table 1: The measurement index system of online red economy and industrial development

Model	Level I indicators	Level II indicators
Indicator system	Economic indicators	Industrial income
		Proportion of industrial added value
	Industrial indicators	Year-on-year growth rate of the industry
		Proportion of industrial personnel
	Development indicators	Performance level

Economic indicators are used to measure the contribution of the online celebrity base to the economic growth of Dalian, specifically measured by the proportion of industrial income and industrial added value [8]. Among them, the industrial income is mainly calculated based on the income of the training system of the online celebrity base and the value of the output with goods.

$$\text{Industrial income (G)} = \text{Benefits of training system} + \text{Output value with goods} + \text{Policy subsidies} \quad (1)$$

The proportion of industrial added value is an indicator to measure the role of online celebrity base in promoting the economic growth of Dalian. The larger the proportion of industrial added value, the stronger the role of online celebrity base in promoting the overall economy of Dalian [9-10]. The calculation data is subject to the overall economic operation of Dalian from 2019 to 2021, as shown in Table 2. The calculation formula is as follows:

$$\text{Proportion of industrial added value (Mn)} = G_i \sum_1^n GDP * 100\% \quad (2)$$

Industrial indicators are the indicators to measure the online popularity base, specifically from two aspects: the year-on-year growth rate of the industry and the proportion of industrial personnel [11]. The year-on-year growth rate of the industry refers to the year-on-year growth rate of the online

celebrity base industry. The calculation formula is as follows:

Table 2: Overall economic operation of Dalian from 2019 to 2021

Indicators	2019	2020	2021
Gross regional product/billion	7001.7	7030.4	7825.9
Primary industry/billion	458.5	459.2	513.3
Secondary industry/billion	2799.8	2815.2	3301.6
Tertiary industry/billion	3743.4	3756.0	4011

$$\text{Year-on-year growth rate of the industry } (R_n) = \frac{P_n - P_{n-1}}{P_{n-1}} * 100\% \quad (3)$$

Among them, P_n refers to the annual output value of the project in n years, P_{n-1} refers to the annual output value of the project in n-1 years. The calculation data is subject to the overall economic operation of Dalian from 2019 to 2021, as shown in Table 2.

The proportion of industrial personnel is a measure of the impact of online celebrity base on Dalian's employment. Specifically, it is calculated by the proportion of employees in the online celebrity base in the total number of employees in Dalian[12]. The larger the proportion of the calculation results, the stronger the role of online celebrity industry in promoting employment. The calculation formula is as follows:

$$\text{Proportion of industrial personnel } (L_n) = \frac{Q_i}{\sum Q} * 100\% \quad (4)$$

Among them, Q_i refers to the number of employees of the project in n years, Q refers to the total number of employees in n years. The calculation data is based on the total number of employees in Dalian from 2019 to 2021, as shown in Table 3.

Table 3: Number of industrial employees in Dalian from 2019 to 2021

Indicators	2019	2020	2021
Number of employees in primary industry/10000	0.8	0.8	0.9
Number of employees in the secondary industry/10000	33.7	33.9	35.6
Number of employees in the tertiary industry/10000	57.6	57.3	61.1

Development indicators measure the level of industrial development. The higher the level of industrial development, the stronger the attraction and promotion of other sectors and industries, Moreover, the stronger the role of industrial integration and development [13]. Here, the development level of the online popularity base is measured by comparing labour productivity. The calculation formula is as follows:

$$\text{Comparative labor productivity } (Y) = \frac{W_n}{GDP_n} * \left(\frac{R_{nw}}{R_n} \right) * 100\% \quad (5)$$

Among them, W_n / GDP_n indicates the proportion of the added value of online celebrity industry in Dalian's GDP in n years. R_{nw} / R_n indicates the proportion of the number of employees of online celebrity industry in Dalian in n years. The calculation results are shown in Table 4.

Table 4: Measured value of online celebrity industry measurement indicators in Dalian

Year	2019	2020	2021
Number of social employees/10000	62.1	62.6	60.4
Social population/10000	698.7	745.4	754
Proportion of industrial population in online celebrity base	0.015	0.024	0.037
GDP/10000	700170000000	703040000000	782590000000
Income from online celebrity base /10000	104160000	312480000	937440000
Proportion of industrial added value of online celebrity base	0.0015	0.0043	0.0127
Year-on-year growth rate of online celebrity base industry	-	2.0	2.0

In order to calculate the weight of each index in the industrial measurement index system of the online celebrity base and further measure the impact of the online celebrity base industrial indicators on the industrial performance of the online celebrity base, the weight of each index is calculated using the

variation coefficient method. The calculation formula is as follows:

$$\text{Coefficient of variation} = \text{Standard deviation} / \text{Average} * 100\% \quad (6)$$

The calculation results show that the network popularity base has a strong role in promoting the overall economy of Dalian, and the network popularity base industry has a positive role in stimulating employment. According to the comprehensive analysis in Table 2, Table 3 and Table 4, the tertiary industry in Dalian accounts for more than half of the total national economy and is the pillar industry for the development of Dalian's national economy. Under the background of digital economy, the online popularity base has brought new opportunities for the development of the tertiary industry. By 2022, Dalian has 98 MCN institutions, nearly 8000 employees and 220000 online celebrities, covering tourism, clothing, agricultural product sales, characteristic industries and other industrial systems. From 2018 to 2020, the GDP of Dalian has increased and decreased. The objective reason for the decrease in the growth rate in 2020 is that the COVID-19 has affected the growth of the number of employees. According to the preliminary calculation of data, the proportion of added value of the online popularity base industry has increased year by year, that is, the digital economy has injected new vitality into its development. The online popularity base mainly involves computer, digital media, digital transactions, the Internet and related services, software and information technology services, communication equipment and other digital economic departments. According to the input-output table, the economic contribution and pulling effect of the digital economy on Liaoning Province are calculated. The influence coefficient, represented by the influence coefficient, is greater than 1, indicating that its influence exceeds the social average and has a greater pulling effect on the national economy. It further proves that the online popularity base plays a positive role in the national economic sector, and has a positive role in promoting industrial development, employment, industrial transformation and upgrading.

3.2. Association Model Construction

Based on the research on the relationship between urban development and industrial transformation and upgrading by building online celebrity bases in China, the research team believes that online celebrity bases under the role of online celebrity economy can promote urban development, industrial transformation and upgrading, etc., so the research hypothesis is put forward: online celebrity economy brings digital transformation and upgrading to traditional industries, is a new engine of economic growth, and building online celebrity bases has greatly promoted the increase of employees and economic growth, It also promoted the transformation and upgrading of related industries. Based on the above analysis, an analysis model is built to analyze the impact of the proportion of employees in the online celebrity base industry on the level of industrial performance.

$$Y = \alpha + xL_n + \beta \quad (7)$$

Among them, Y represents the level of performance, L_n represents the proportion of employees in representative industries, β represents the random error.

The calculated industrial performance level and proportion of industrial employees of the online celebrity base are substituted into SPSS 20.0 for linear regression fitting. The fitting model is shown in Table 5, Table 6 and Table 7.

Table 5: Model Summary

Model	R	R side	Adjust R side	Error of standard estimate
1	0.0998	0.0997	0.994	0.0097905

Table 6: Variance analysis

Model	Sum of squares	df	Mean square F	Sig
Regression 0.030	1	0.030	315.796	0.036
Residual 0.000	1	0.000		
Total 0.030	2			

Table 7: Coefficient evaluation

Model	Denormalization coefficient		Standard coefficient Trial version	t	Sig
	B	Standard error			
Constant	-0.070	0.017		-4.229	0.148
Ln	11.043	0.621	0.998	17.771	0.036

According to the model calculation:

$$Y=11.403\ln-0.070 \quad (8)$$

Every increase in the number of employees in online celebrity industry can increase the performance level of 11.043 industries. Combined with the data in Table 5, Table 6 and Table 7, $R^2 = 0.994$, greater than 0.05, which shows that the fitting degree is good; $\text{Sig}=0.036$, less than 0.05, which means the results were significant, indicating that the model had statistical significance.

4. Conclusions

We based on the analysis of GDP, primary industry, secondary industry, tertiary industry GDP changes and employment changes over the years in Dalian, we can see that the economic development of Dalian mainly depends on the tertiary industry, especially tourism as one of the key industries. According to the data released by Dalian Municipal Bureau of Statistics, the tertiary industry will reach 374.34 billion yuan in 2019, 375.6 billion yuan in 2020, 401.1 billion yuan in 2021. The overall cumulative economic growth rate will reach about 5% - 7%, and the cumulative growth rate of the tertiary industry will reach about 8%. However, affected by the COVID-19, the growth rate of the tertiary industry will weaken in 2020. Based on the special geographical location and resource advantages, the tertiary industry will still be the pillar industry of Dalian for a long time; At the same time, online celebrity economy has brought positive influence on the development of the tertiary industry in Dalian, that is, digital economy represented by online celebrity economy is one of the main directions of the future industrial development in Dalian.

Based on the selection of the three indicator systems of economy, industry and development and the establishment of the model, the industrial added value has increased year by year, which shows that the role of the online celebrity base in driving the overall economy of Dalian is gradually increasing, and also shows that the development of the online celebrity base is increasingly attracting and promoting other sectors, industries, and industrial transformation and upgrading, especially the role of the online celebrity economy in the software. The pulling effect of digital economic sectors such as computers will become more and more obvious. According to the model calculation, every additional unit of the number of employees in the online popularity base can increase 11.043 industrial performance levels, that is, the number of employees in the online popularity base has a significant impact on the level of industrial development, which further proves that the online popularity base can promote employment. Therefore, the online popularity base has a certain pulling effect on Dalian's economy, employment, urban development, and industrial transformation and upgrading.

Acknowledgements

Key project of Liaoning social science planning fund in 2022 (Project No.L22AJY021).

References

- [1] Liu Y, Zhang Q. (2017) Research on association rules mining algorithm based on large data. *Revista de la Facultad de Ingeniería*, 32(8):229-236.
- [2] Pierot L, Molyneux A, Byrne J. (2016) O-020WEB Aneurysm Treatment: Preliminary Results of WEBCAST 2 Study. *Journal of Neurointerventional Surgery*, 8(Suppl 1): A13.2-A14.
- [3] Guschwan Matthew. (2016) Broadcast media: live and in-person. *Soccer & Society*, 17(3):332-350.
- [4] Hwang J H. (2016) Mining Association Rule on Service Data using Frequency and Weight. *Journal of Digital Contents Society*, 17(2):81-88.
- [5] Nagy J T, Bernschuetz M. (2016) The impact of webinar-webcast system on learning performance. *Education & Information Technologies*, 21(6):1837-1845.
- [6] Fu X. (2022) Research and Analysis Report on the Development of Webcast in China. *Literature and Art Studies: English Version*, 12(2):160-166.

- [7] Bei W. (2017) *Analysis of the impact of webcasting on contemporary college students. Vocational Education (Mid-term Issue)*, 07 (No.105):49-52.
- [8] Yildirim P, Birant K U, Birant D. (2020) *Multitask-based Association Rule Mining*. *Turkish Journal of Electrical Engineering and Computer Sciences*, 28(2):933-955.
- [9] Zhou W, Xia X, Zhang Z, et al. (2020) *Association rules mining between service demands and remanufacturing services*. *Artificial Intelligence for Engineering Design Analysis and Manufacturing*, 35(2):1-11.
- [10] Yen S J, Wang C K, Lee Y S. (2016) *Mining Consumption Association Rules*. *Journal of information science and engineering*, 32(2):271-285.
- [11] Jingle I, Celin J. (2017) *Mining optimized positive and negative association rule using advance ABC algorithm*. *Journal of Theoretical and Applied Information Technology*, 95(24):6846-6855.
- [12] Mao L. (2017) *Analysis on the enterprise financial risk based on interactive data association rule mining technology*. *Boletin Tecnico/Technical Bulletin*, 55(6):772-781.
- [13] Yong W (2016) *FERC 'Webcast-Only' Meeting Prompted by Widening Protests*. *Natural gas intelligence*, 35(39):13-13.