

Industry Governance in the Scene of "Live Commerce" --Economic Analysis Based on Three-party Evolutionary Game Model

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ABSTRACT

Aiming at the confusion of fake products, exaggerated propaganda and misleading consumers in the industry of "live commerce", a three-party evolutionary game model of brand, live broadcast platform and consumers is constructed to provide product quality for brand, the evolution game analysis of behavior interaction and strategy selection mechanism between Product Review Decision and consumer purchase decision is carried out in the live broadcast platform. The results show that controlling and adjusting the parameter variables can make the participants of the game choose the stable strategy. The strategic choice of brand and live broadcast platform is not only restricted by the trend of economic benefit, but also by external supervision. Establishing and perfecting the supervision system and unblocking the channel of protecting consumers' rights are beneficial to the healthy development of "live commerce" industry.

Keywords: Live commerce, three-party evolutionary game, collaborative governance

1. INTRODUCTION

At present, "live online shopping", as a new shopping mode, is gradually changing people's traditional shopping mode, which is conducive to stimulating residents' consumption potential and releasing the vitality of domestic demand in China. At the same time, a number of web celebrity live broadcasting platforms such as Li jiaqi and Wei Ya have emerged. "Live commerce" is gradually adopted by most businesses and gradually recognized by most consumers. During the outbreak period, when other modes of production were hit hard, the live commerce grew rapidly. According to iimedia, it went up from 19 billion yuan in 2017 to 433.8 billion yuan in 2019, it is expected to double again by 2020 to 960 billion yuan. One of the reasons that live streaming is so popular is that web celebrity anchors convert their own traffic into professional credit, which reduces the operating cost of enterprises and the cost of product publicity. The other is consumers use their leisure time to buy products with high cost performance, which can not only gain price advantage but also reduce search cost, thus realizing win-win for brand, live platforms and consumers. As a new thing, platform economy inevitably has some non-standard and imperfect places. Because of the existence of Information asymmetry, the live broadcast platform is uncertain about the quality of the products provided by the brand, and the consumers don't know the real information of the products sold in the live broadcast room. At present, due to the lack of applicable legal system and the uncertainty of authority and responsibility of the competent units, there is still great room for

improvement. Therefore, it is necessary to conduct in-depth governance on the "live commerce" industry.

In this paper, we use the three-party evolutionary game model to analyze "live commerce". Take the brand, the live broadcast platform and the consumer establishment as the game main body, establishes the game model, carries on the logical deduction of the concrete influence factor by the mathematical analysis way, obtains the scientific conclusion, reflect the influence effect of each influence factor in the course of three-way interaction. In order to promote the healthy development of the new online shopping mode of "live commerce", this paper probes into the influencing factors of the three-party cooperation.

2. "LIVE COMMERCE" MODEL AND RELATED LITERATURE

2.1. "Live Commerce" Mode

"Live commerce" model is to network live platform as the core, live platform as the carrier, the fan content output of the product recommended personalized marketing. (Li Kecheng, 2020). With the advantages of interactivity, timeliness and strong liquidity, the essence of "live commerce" is platform economy, and it is a marketing model using its own private traffic for product promotion, the utility model can effectively alleviate the problems of incomplete information and Information asymmetry in the process of online shopping.

2.2. Literature Review

2.2.1. The concept and characteristics of platform economy

"Live commerce", a kind of platform economy, is a new marketing model under the platform economy. The academic research on platform economy theory, especially on bilateral market, tends to mature. As early as 2004, Rochet and Tirole put forward the concept of "two-sided market", which holds that the two-sided market can increase the cost of one side of the market, and reduce the other party's fees by the same amount[1]. The parties to a transaction need to transact through a platform, and the gain from one party joining the platform depends on the number of other parties joining the platform[2]. He Hongchao, a domestic scholar, started his research on platform economy by analyzing the competition and cooperation of real estate enterprises taking WanKe as an example, and put forward the concept of "platform economy" for the first time. The paper holds that "platform economy" is to form a new competitive system by means of integration or by means of the energy of the organization, so as to achieve the goal of promoting one's own competitive power, and the partners enjoy the added value brought by the new system in a balanced way[3]. In recent years, with the development of Internet economy, the research on "platform economy" has turned to the bilateral market based on network information technology. In general, the platform itself does not produce products, the platform is essentially a link and access channel, providing a place to connect buyers and sellers, the platform charges a service fee to facilitate the completion of the transaction while resolving the Information asymmetry and reducing transaction costs[4]. Platform enterprises integrate multiple resources while maintaining each other's interests, thus, creating value-added services and value-added [5].

To study the development and regulation of platform economy, we should not only understand the connotation of platform economy, but also understand the characteristics of platform economy. In defining the characteristics of platform economy, Lu Benfu (2018) believes that, platform economy has four main characteristics: one is to rely on user participation, two is information accurate matching, three is bilateral market, cross network externality, four is cross-border. Li Ziwen (2018) believes that, in addition to the above features, the platform economy should be characterized by economies of scale and asymmetric prices[6].

2.2.2. Governance of platform economy

With the development of platform economy, fake and inferior products, information leakage, false advertisement and so on occur from time to time. The existing theory of platform economy governance can be divided into three ways, namely, early platform enterprise internal governance,

government external regulation and later collaborative governance. Regarding the internal governance of platform enterprises, Gao Shaoli (2017) believes that the way of platform governance is to formulate and implement internal governance rules and clarify the obligations and responsibilities of the participants, internal Governance embodies the advantages of rules, data, technology, efficiency and co-governance. While clarifying the responsibilities and obligations of each party, it also increases the degree of punishment to guide the healthy development of the platform[7]. In the external regulation of the government, Wei Xiaoyu (2017) advocated the adoption of cooperative governance model, in order to avoid the Internet platform economy often wandering in the "gray zone" of the law, to establish sound laws and regulations and rules. At the same time, we should create a suitable environment for cooperative governance and improve the administrative reform of government information disclosure[8]. Wang Yukai (2018) believes that the government should use the Internet, big data, cloud computing, Internet of things and other technologies to build its own information network platform to enhance the government's regulatory services[9]. Tao Xidong and Liu Sihong (2013) proposed that a new model of government governance should be constructed to meet the requirements of the platform's economic development from the perspectives of legal norms, inter-departmental coordination and supervision, unified network supervision and the building of a research platform for think tanks[10]. At present, the theory and practice tend to think that platform economic governance can not only rely on one side of the power, should adhere to cooperative governance. The platform economic governance also goes beyond the past experience and the policy system's pattern, and focuses on the new form of business and the new pattern's own characteristics, the evolution trend and the network's own characteristics such as "decentralization" and "self-organization", establishment of a co-governance system in terms of technology, policy and social evaluation[11], in particular the establishment of a consumer complaint mechanism to protect the legitimate rights and interests of consumers [12].

2.2.3. Application of game theory in platform economic governance

Since the platform economy has developed rapidly in recent years, the research on the regulation of the platform economy by game theory is still in its initial stage, and the research is mainly carried out by the strategic behavior and interaction under the Information asymmetry. The research object involves different platforms, mainly e-commerce platform, take-away platform, lending platform, crowd funding platform, etc. Specifically, from the perspective of psychological contract, Li Baoku and Zhang Mingxiao (2018) constructed a single-game model and a multiple-game model for buyers and sellers in apparel e-commerce transactions, the penalty intensity and performance income

are introduced into the model to study the performance behavior in the course of transaction[13]. Gu Dingwei (2020) and other peer-to-peer (P2P) platforms in view of the uneven quality, from the perspective of the bilateral market to build a peer-to-peer platform and the three-party game model between borrowers and lenders, this paper studies the signal display behavior and its influencing factors of high quality P2P and low quality P2P platforms[14]. The trust crisis in the online donation market can also be solved by a game model, which constructs a tripartite dynamic evolution model of the donor, the Information asymmetry and the platform, to analyze the participants' strategic behavior, evolutionary trend and equilibrium state, to analyze the influencing factors, to construct social mechanism and to resolve the trust crisis[15].

2.2.4. Literature review

According to the literature review, there is still room to apply Game Theory to the management of fraud and fraud caused by Information asymmetry in platform economy. On the one hand, the hypothesis of the paper is contrary to the reality, researchers often use the hypothesis of the completely rational person in the research process, but in reality the behavior is limited rational person. On the other hand, the application of game model needs to be improved. The mixed-strategy game model is better than the pure-strategy game model, because the players' strategies are chosen with a certain probability. Dynamic Game Model and evolutionary game model are better than static game model, because the choice of players has a sequential relationship, that is to say, the players interact with each other and the game is often multi-turn. Through the dynamic analysis of group game, the evolutionary game model can find the players' interest payment and stable evolution state under different strategies.

3. ANALYSIS FRAMEWORK AND MODEL DESIGN

3.1. Main Body of the Model

The participants of "live commerce", that is, the participants of the game are mainly the brand, the live platform and the consumers. The specific behavior of the three parties is set as:

The brand: the provider of the product, through the use of live broadcast platform traffic to expand product publicity, increase product sales.

Live broadcast platform: live broadcast platform provides online display, consults and answers questions, guides sales and other services, and through consultation and cooperation with the brand side, for consumers to seek prices, gifts and other benefits.

Consumers: voluntarily purchase products and services they like, based on their own needs and other factors.

3.2. Study Hypothesis of the Model

3.2.1. Bounded rationality

In order to accord with the real situation, it is assumed that all the players are bounded rationality. For the sake of self-interest, the products provided to the live broadcast platform and consumers may be superior goods or inferior goods. The choice made by the brand side in order to obtain the maximum utility belongs to the bounded rational behavior. When the brand direction direct broadcast platform sends out the cooperation intention, the direct broadcast platform for own benefit consideration, may carry on the examination to the brand side's commodity, may also not carry on the examination, live platform with the help of the brand side of cooperation on the one hand to increase their economic gains, on the other hand to increase their visibility, is a limited rational behavior. Consumers go into the studio and buy products and services based on their own needs and other factors such as live advertising, and because of Information asymmetry, the goods and services they choose may be inferior or superior, it's bounded rationality.

3.2.2. Information asymmetry

In the "live commerce" scenario, the information is neither complete nor symmetrical. There is a Information asymmetry problem between the participants, which is why the "live commerce" industry needs to be governed. Live broadcast platform is not sure of the quality of the products provided by the brand, consumers do not know the quality of the products and live broadcast platform whether there is the phenomenon of exaggerated publicity.

3.2.3. Mode of payment

This paper assumes that the brand pays for the live broadcast platform by piece, and the brand pays according to the number of products sold by the live broadcast platform.

3.3. Strategy Selection and Model Construction Of Participants

3.3.1. Strategic choice of participants

In the "live commerce" scenario, the three-party game players, namely the brand, live broadcast platform, the consumer's game strategy is as follows:

The brand. The brand's behavior strategy choice is S1 (provides the superior goods, provides the inferior goods). Based on the mixed strategy model of Game Theory, suppose the probability that the brand chooses to offer the superior goods is x , $x \in [0,1]$, then the probability of offering the inferior goods is $(1-x)$.

Live streaming platform. The live platform represents the brand's products and recommends them to consumers, so the live platform's behavior strategy is S2(review product quality, not product quality) . If the live platform chooses to review the product information probability is: $y, y \in [0,1]$, then the probability of not reviewing the product information is $(1-y)$.

Consumers. The consumer chooses S3(buy, don't buy) as the behavior strategy of the product for their own needs and other factors. Suppose that the probability of the consumer buying the product is $z, z \in [0,1]$, then the probability of choosing not to buy is $(1-z)$.

The decision-making interactions of the three players form a dynamic model of the three-way game, as shown in Figure 1:

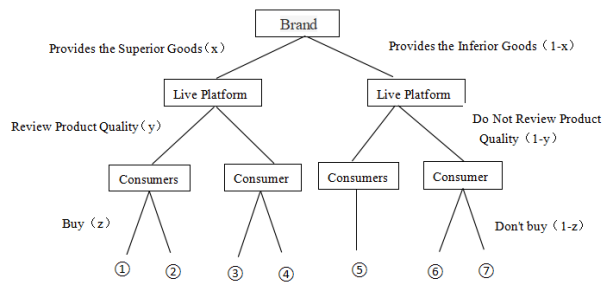


Figure 1 A three-party dynamic game model in the "live commerce" scenario

3.3.2. Participant's payoff Matrix

Therefore, the payment Matrix of brand, live platform, consumer and the parameter definition in them are listed in Table 1 and Table 2 respectively.

4. EQUILIBRIUM ANALYSIS OF THREE-PARTY EVOLUTIONARY GAME

4.1. Construct the Expected Revenue Function

4.1.1. Expectation function of brand

If the expected return of brand choosing the behavior strategy of "providing superior goods" be U_{11} , and the expected return of brand choosing the behavior strategy of "providing inferior goods" be U_{12} , then the average return of brand is \bar{U}_1 , then:

$$U_{11} = [y \quad 1-y] \begin{bmatrix} U1+E1+T1-D1 & U1+T1+D1-A1 \\ U1+E1 & U1-A1 \end{bmatrix} \begin{bmatrix} z \\ 1-z \end{bmatrix}$$

$$= yz(U1+E1+T1-D1) + y(1-z)(U1+T1-D1-A1) + z(1-y)(U1+E1) + (1-y)(1-z)(U1-A1) \tag{1}$$

$$U_{12} = y(U1-A2) + (1-y)[U1+E1-A3 \quad U1] \begin{bmatrix} z \\ 1-z \end{bmatrix}$$

$$= y(U1-A2) + z(1-y)(U1+E1-A3) + (1-y)(1-z)U1 \tag{2}$$

$$\bar{U}_1 = xU_{11} + (1-x)U_{12} \tag{3}$$

4.1.2. Expectation function of live broadcast platform

If U_{21} is the expected payoff of a live platform choosing a behavior strategy to review product quality, and U_{22} is the expected payoff of a behavior strategy not to review product quality, then the average payoff of a live platform is \bar{U}_2 , then:

$$U_{21} = (1-x)(T3-D2) + x[U2+T2-D2 \quad T2-D2] \begin{bmatrix} z \\ 1-z \end{bmatrix}$$

$$= (1-x)(T2-D2) + xz(U2+T2-D2) + x(1-z)(T2-D2) \tag{4}$$

$$U_{22} = [x \quad 1-x] \begin{bmatrix} U2 & 0 \\ U2-B1 & 0 \end{bmatrix} \begin{bmatrix} z \\ 1-z \end{bmatrix}$$

$$= xzU2 + (1-x)z(U2-B1) \tag{5}$$

$$\bar{U}_2 = yU_{21} + (1-y)U_{22} \tag{6}$$

Table 1 Brand —live broadcast platform—consumer tripartite game payment Matrix

Serial number	Strategic Choice (brand side, live platform, consumer)	Revenue
①	(1,1,1)	$(U1+E1+T1-D1, U2+T2-D2, U3-C1)$
②	(1,1,0)	$(U1+T1-D1-A1, T2-D2, 0)$
③	(1,0,1)	$(U1+E1, U2, U3-C1)$
④	(1,0,0)	$(U1-A1, 0, 0)$
⑤	(0,1,0)	$(U1-A2, T2-D2, C3)$
⑥	(0,0,1)	$(U1+E1-A3, U2-B1, U3-C1-C2-D3)$

(0,0,0)

(U1,0,C3)

(U1,0,C3)

Table 2 Parameter definitions

Symbols	definitions
U1	The economic benefit that brand obtains through cooperation with live broadcast platform.
E1	The brand provides the economic benefits of the purchase of premium goods by consumers.
D1	The cost of product review by the brand through the live platform.
T1	The additional social trust benefits earned by the brand as a result of being verified for providing premium products.
A1	The sunk cost of the brand's failure to increase sales by partnering with live streaming platforms.
A2	The legal liability of the brand party for providing inferior goods.
A3	The social costs incurred by the brand after being investigated for providing inferior goods.
U2	The live broadcast platform gets the economic benefits such as agency fee because of the cooperation with the brand side.
T2	The additional social trust benefits that a live streaming platform receives from reviewing product quality. The time cost and economic cost borne by the live broadcast platform due to the product quality review.
D2	
B1	Social costs incurred by live streaming platforms for not reviewing product quality.
U3	The discounts and benefits that consumers enjoy when buying products through live streaming.
D3	The cost to consumers of identifying the quality of a product. The monetary cost to the consumer of a product.
C1	The cost to the consumer of a product.
C2	Consumers are psychologically burdened by the purchase of inferior goods.
C3	Additional benefits to consumers from not purchasing the product.

4.1.3. Consumer expectation function

If we assume that the expected return of the consumer's buying behavior is U_{31} and that of the consumer's non buying behavior is U_{32} , then the average return of the consumer is \bar{U}_3 , then:

$$U_{31} = [x \quad 1-x] \begin{bmatrix} U3-C1 & U3-C1 \\ 0 & U3-C1-C2-D3 \end{bmatrix} \begin{bmatrix} y \\ 1-y \end{bmatrix}$$

$$= x(U3-C1) + (1-x)(1-y)(U3-C1-C2-D3) \quad (7)$$

$$U_{32} = [x \quad 1-x] \begin{bmatrix} 0 & 0 \\ C3 & C3 \end{bmatrix} \begin{bmatrix} y \\ 1-y \end{bmatrix}$$

$$= (1-x)C3 \quad (8)$$

$$\bar{U}_3 = zU_{31} + (1-z)U_{32} \quad (9)$$

4.2. Replication Dynamic Equation of Evolutionary Game Model

The replication dynamic equation for a brand to choose the "provide superior products" strategy is:

$$F(x) = \frac{\partial x}{\partial t} = x(U_{11} - \bar{U}_1) = x(1-x)(U_{11} - U_{12})$$

$$= x(1-x)[y(T1 + A2 - D1) + yzE1 + z(1-y)A3 - (1-z)A1] \quad (10)$$

The replication dynamic equation for the live platform to select the "product quality review" strategy is:

$$F(y) = \frac{\partial y}{\partial t} = y(U_{21} - \bar{U}_2) = y(1-y)(U_{21} - U_{22})$$

$$= y(1-y)[x(T2 - D2) + (1-x)(T2 - D2 - zU2 + zB1)] \quad (11)$$

The replication dynamic equation for the consumer to choose the "buy product" strategy is:

$$F(z) = \frac{\partial z}{\partial t} = z(U_{31} - \bar{U}_3) = z(1-z)(U_{31} - U_{32})$$

$$= z(1-z) \left[\frac{(1-x)(1-y)(U3-C1-C2-D3)}{+x(U3-C1+C3)-C3} \right] \quad (12)$$

4.3. Equilibrium Analysis of Three-Party Evolution Model

According to the "stability theorem" of the differential equation, the stability of the three-way evolutionary game is analyzed:

$$F(x) = 0, F'(x) = \frac{\partial F(x)}{\partial x} < 0 \quad (13)$$

$$F(y) = 0, F'(y) = \frac{\partial F(y)}{\partial y} < 0 \quad (14)$$

$$F(z) = 0, F'(z) = \frac{\partial F(z)}{\partial z} < 0 \quad (15)$$

Among them,

$$F'(x) = \frac{\partial F(x)}{\partial x} = (1-2x) \left[\begin{matrix} y(T1+A2-D1) + yzE1 \\ +z(1-y)A3 - (1-z)A1 \end{matrix} \right] \quad (16)$$

$$F'(y) = \frac{\partial F(y)}{\partial y} = (1-2y) \left[\begin{matrix} x(T2-D2) + (1-x) \\ (T2-D2-zU2+zB1) \end{matrix} \right] \quad (17)$$

$$F'(z) = \frac{\partial F(z)}{\partial z} = (1-2z) \left[\begin{matrix} (1-x)(1-y)(U3-C1-C2-D3) \\ +x(U3-C1+C3) - C3 \end{matrix} \right] \quad (18)$$

4.3.1. Stability analysis of brand strategy

Let $F(x)=0$, then $x_1=0, x_2=1, y^* = \frac{(1-z)A1 - zA3}{T1 + A2 - D1 + z(E1 - A3)}$

Therefore, the solution satisfying $\begin{cases} F(x)=0 \\ \frac{\partial F(x)}{\partial x} < 0 \end{cases}$ is an equilibrium solution. The discussion was divided into three categories:

① When $y^* = \frac{(1-z)A1 - zA3}{T1 + A2 - D1 + z(E1 - A3)}, F(x) = \frac{dx}{dt} \equiv 0$.

At this point X is stable regardless of any value it takes.

② When $0 < y < \frac{(1-z)A1 - zA3}{T1 + A2 - D1 + z(E1 - A3)} < 1$,

$F'(0) < 0, F'(1) > 0$. Then $x = 0$ is the evolutionarily stable strategy, and the brand chooses the strategy of "providing inferior products".

③ When $0 < \frac{(1-z)A1 - zA3}{T1 + A2 - D1 + z(E1 - A3)} < y < 1, F'(0) > 0$,

$F'(1) < 0$. Then $x = 1$ is the evolutionarily stable strategy, and the brand chooses the strategy of "providing superior products".

4.3.2. Stability analysis of live broadcast platform strategy

Let $F(y)=0$, then: $y_1=0, y_2=1, x^* = \frac{D2 - T2 + z(U2 - B1)}{z(U2 - B1)}$

Therefore, the solution satisfying $\begin{cases} F(y)=0 \\ \frac{\partial F(y)}{\partial y} < 0 \end{cases}$ is an equilibrium solution. The discussion was divided into three categories:

① When $x^* = \frac{D2 - T2 + z(U2 - B1)}{z(U2 - B1)}, F(y) = \frac{dy}{dt} \equiv 0$.

At this point Y is stable regardless of any value it takes.

② When $0 < x < \frac{D2 - T2 + z(U2 - B1)}{z(U2 - B1)} < 1, F'(0) < 0$,

$F'(1) > 0$. Then $y = 0$ is the evolutionarily stable strategy, and the live broadcast platform chooses "do not examine the product quality".

③ When $0 < \frac{D2 - T2 + z(U2 - B1)}{z(U2 - B1)} < x < 1, F'(0) > 0$,

$F'(1) < 0$. then $y = 1$ is the evolutionarily stable strategy, and the live broadcast platform chooses "to review the product quality".

4.3.3 Stability analysis of consumer strategy

Let $F(z)=0$, then: $z_1=0, z_2=1, x^* = \frac{C1 + C2 + C3 + D1 - U3}{U3 + C2 + C3 + D3}$

Therefore, the solution satisfying $\begin{cases} F(z)=0 \\ \frac{\partial F(z)}{\partial z} < 0 \end{cases}$ is an equilibrium solution. The discussion was divided into three categories:

① When $x^* = \frac{C1 + C2 + C3 + D1 - U3}{U3 + C2 + C3 + D3}, F(z) = \frac{dz}{dt} \equiv 0$.

At this point Z is stable regardless of any value it takes.

② When $0 < x < \frac{C1 + C2 + C3 + D1 - U3}{U3 + C2 + C3 + D3} < 1, F'(0) < 0$,

$F'(1) > 0$. At this point, $Z = 0$ is evolutionarily stable, and the consumers choose the "don't buy" strategy.

③ When $0 < \frac{C1 + C2 + C3 + D1 - U3}{U3 + C2 + C3 + D3} < x < 1, F'(0) > 0$,

$F'(1) < 0$. At this point, $Z = 1$ is evolutionarily stable, that is, consumers choose the "buy" strategy.

4.4. Stability Analysis of three-party evolutionary game

Friedmann (1998) thought that the evolutionary equilibrium must be a nash equilibrium, but the evolutionary stable strategy is not necessarily an evolutionary equilibrium. Based on the replication dynamic equation, the evolutionary stable strategy can be guaranteed to be an evolutionary equilibrium. In the evolutionary game model, under the assumption of incomplete rationality, the behavior choice of the players will change with time, thus changing the evolutionary equilibrium point and finally reaching the stable point, but Evolutionary Games ultimately tend to that equilibrium depending on the initial state. In evolutionary game models, Jacobian Matrix is often used to analyze the stability of equilibrium point, and finally a stable strategy (ESS) is obtained. The following partial derivatives with respect to x, Y, and Z are obtained for the three copy dynamic equations. The Jacobian Matrix for replicating dynamic equations is:

$$J = \begin{bmatrix} J_{11} & J_{12} & J_{13} \\ J_{21} & J_{22} & J_{23} \\ J_{31} & J_{32} & J_{33} \end{bmatrix} \quad (19)$$

$$J_{11} = \frac{\partial F_1(x, y, z)}{\partial x} = (1-2x) \left[\begin{matrix} y(T1+A2-D1)+yzE1 \\ +z(1-y)A3-(1-z)A1 \end{matrix} \right] \quad (20)$$

$$J_{12} = \frac{\partial F_1(x, y, z)}{\partial y} = x(1-x) [T1+A2-D1+z(E1-A3)] \quad (21)$$

$$J_{13} = \frac{\partial F_1(x, y, z)}{\partial z} = x(1-x) [yE1+(1-y)A3+A1] \quad (22)$$

$$J_{21} = \frac{\partial F_2(x, y, z)}{\partial x} = y(1-y)(zU2-zB1) \quad (23)$$

$$J_{22} = \frac{\partial F_2(x, y, z)}{\partial y} = (1-2y) \left[\begin{matrix} x(T2-D2)+(1-x) \\ (T2-D2-zU2+zB1) \end{matrix} \right] \quad (24)$$

$$J_{23} = \frac{\partial F_2(x, y, z)}{\partial z} = y(1-y)(1-x)(B1-U2) \quad (25)$$

$$J_{31} = \frac{\partial F_3(x, y, z)}{\partial x} = z(1-z) \left[\begin{matrix} (1-y)(D3+C1+C2-U3) \\ +(U3-C1+C3) \end{matrix} \right] \quad (26)$$

$$J_{32} = \frac{\partial F_3(x, y, z)}{\partial y} = z(1-z)(1-x)(D3+C1+C2-U3) \quad (27)$$

$$J_{33} = \frac{\partial F_3(x, y, z)}{\partial z} = (1-2z) \left[\begin{matrix} (1-x)(1-y)(U3-C1-C2-D3) \\ +x(U3-C1+C3)-C3 \end{matrix} \right] \quad (28)$$

The paper analyzes eight equilibrium points of the three-party evolutionary game, but when the brand chooses to "provide inferior products" and the live broadcast platform chooses "review product quality", under the assumption of bounded rationality, consumers can not choose to "buy products". Therefore, it is only necessary to analyse the remaining seven equilibrium points, namely E1(0,0,0), E2(0,0,1), E3(0,1,0), E4(1,0,0), E5(0,1,1), E6(1,0,1) and E7(1,1,1). This paper mainly studies the governance problem in the scene of "live commerce", so E7 is the best running state of the industry, that is, the brand chooses "to provide excellent products", and the live platform chooses "to review product information", consumers choose to "buy the product". In this paper, we use the characteristic root method to analyze the stability of the game. Therefore, if we define E7 as the stable point of the evolutionary game, we need to satisfy:

$$\text{When } E_7(1,1,1), J_1 = \begin{bmatrix} -(T1+A2-D1+E1) & 0 & 0 \\ 0 & -(T2-D2) & 0 \\ 0 & 0 & -(U3-C1) \end{bmatrix}$$

It also has to meet the following conditions:

$$\begin{cases} \text{Det } J_1 = -(T1+A2-D1+E1)(T2-D2)(U3-C1) > 0 \\ \text{Tr } J_1 = -(T1+A2-D1+E1)-(T2-D2)-(U3-C1) < 0 \end{cases}$$

$$\text{That is: } \begin{cases} -(T1+A2-D1+E1) < 0 \\ -(T2-D2) < 0 \\ -(U3-C1) < 0 \end{cases}$$

According to the above analysis, the utility of a single participant is not only affected by its own factors, but also by the behavior choices of the other two participants in the "live commerce" scenario, want the market to achieve a perfect state of stability, the need for brands, live broadcast platform and consumers of tripartite joint efforts, collaborative governance.

For Brands, increase the value of T1, A2, and E1, and decrease the value of D1. On the one hand to increase the

brand to provide superior goods and get additional revenue, increase the legal punishment for providing inferior goods, increase the brand to break the law, default costs. On the other hand, to reduce the cost of the brand to provide product review to the live platform, such as reducing the cost of product quality inspection, simplify the quality inspection process, etc.

For live broadcast platforms, increase the value of T2 and decrease the value of D2. Improve the social benefits of product quality review, while reducing the time and economic costs of product review. Specifically speaking, on the one hand, the live platform through the product quality review, access to more platform users, generate incremental returns to scale, and win the trust of users and live platform reputation. On the other hand, the live broadcast platform should be equipped with professional review team to improve the efficiency of product quality review and reduce the cost borne by product review, make live broadcast platform more inclined to choose "review product quality" motivation and incentives.

For Consumers, increase U3 and decrease C1. Only when consumers choose to "buy", to complete the interests of the game between the three parties closed, otherwise if the product has no consumer market, the efforts of both parties will be futile, will only increase more sunk costs. Therefore, the live broadcast platform should strive for greater discounts and preferential benefits for consumers, reduce the risks and losses that consumers bear when they buy products, and increase their propensity to consume.

5. COUNTERMEASURES AND SUGGESTIONS

5.1. Regulate the Behavior of the Brand to Ensure the Quality of Product Supply

On the one hand, the brand should fulfill the relevant obligations. The brand, as a supplier of goods and services, shall check whether it has the qualification and license for the goods or services it provides, and in the live broadcast platform and regulatory authorities to provide real information, relevant license and product inspection reports, to provide products and services must be legal, compliance, in line with production standards. On the other hand, the supervision department should strengthen supervision. The supervisory department must make clear the scope of supervision and strengthen the consciousness of supervision. Departments and departments can not pass the buck to each other, so that "live with goods" become a place outside the law. Establish an information publication platform, carry out regular spot checks on consumers' reports of cases and complaints, publish the results, follow up the processing process and conduct post-sale satisfaction surveys in a timely manner, and cut off inferior products from the source to enter the market.

5.2. Strengthen Supervision And Promote the Development of Live Broadcast Platform Industry

5.2.1. Perfect laws and regulations

As a new marketing model of platform economy, the system and legal norms in this field are not relatively perfect, especially the laws related to the business and supervision of the platform are relatively lacking, therefore, it is necessary to clearly define the legal attributes of the participants of live-streaming goods, perfect the relevant legal norms, and avoid the wild growth of live-streaming goods industry. To perfect and supplement relevant laws, such as the law of the People's Republic of China on advertising, the Law of the People's Republic of China on electronic commerce, the law of the People's Republic of China on the protection of consumers' rights and interests, and the law of the People's Republic of China on product quality, in order to protect the interests of multiple participants, punish the illegal activities and subjects, increase the cost of illegal activities, and promote the healthy and orderly development of "live commerce" .

5.2.2. Construction of credit evaluation system

We will improve the integrity evaluation system and reward and punishment mechanisms, and punish the sale of fake products, exaggerated publicity, the use of fake orders, speculation in letters and other traffic, as well as the falsification of transaction data and user evaluations, the establishment of the seller, live broadcast platform, live broadcast platform accountability mechanism. As for the live broadcast activities that arbitrarily exaggerate, cheat and mislead consumers, they will be brought into the social integrity assessment system, and the live broadcast platforms with serious violations of the law and more misdeeds will be pulled into the integrity blacklist, and the market will be banned, to increase their illegal live streaming costs.

5.2.3. Setting the threshold for industry entry

Improve the industry access system, on the one hand, the live broadcast platform and the professional qualifications of the anchor, to rectify or suspend the operation of broadcasting platforms and hosts with poor quality and content that are not up to standard in terms of operation and hardware and software facilities. On the other hand, we should make clear the obligation of live broadcasting platform and Anchorperson, not to sell the products with poor quality or prohibited by the state. During live broadcasting, anchorpersons should pay attention to their personal qualities, strengthen the professional and professional training of anchorpersons, and improve their

own qualities, jointly create a good network live broadcast environment.

5.3. Protecting the Legitimate Rights and Interests of Consumers

First of all, we should establish and improve the mechanism for protecting consumer rights and interests, and unblock the channels for complaints and rights protection. In the process of "live commerce" , access to third-party supervision and rights protection channels, timely investigation and handling of problems reported by consumers, and improving the efficiency of problem-solving; secondly, the establishment of a unified platform for reporting violations of live-broadcast carrying goods and rights protection, put the live streaming products under the effective supervision of the whole people, especially the news supervision. Through big data processing, we can focus on the brands, the live broadcasting platform and the anchorpersons who have more bad comments on the consumer complaints, concentrate on the processing and follow up the rectification Finally, various forms of publicity, education, in order to improve consumer awareness and willingness to defend their rights, guide every consumer to do their own consumer rights and interests as a "gatekeeper"

6. CONCLUSION

In this paper, Evolutionary Game Theory is used to analyze the strategy choice of the players of brand, live platform and consumers in the "live commerce" scenario, in order to study the market governance in the delivery industry, to promote the "live commerce" of this new model of long-term development. Research Conclusion:

First, in the process of the dynamic game, the three parties tend to the stable point $E7(1,1,1)$, that is, the strategy combination of "providing superior goods" , "inspecting product quality" and "buying" , not relying on one party's strength, it's a three-way street. The change of one party's strategy will affect the benefit of the other two parties, and then affect the choice of strategy.

Secondly, the factors that affect the stability of the evolutionary game model are: The punishment of law, the fairness and justice of society, the benefit of social trust, the cost of product quality review and the network externality based on the traffic. By adjusting the above variables, the evolutionary game model is finally pushed to the stable point. Based on the above analysis, an operational collaborative governance system is developed to promote the healthy and long-term development of the live-broadcast and cargo-carrying industry.

There are some deficiencies in the research process of this paper, such as the lack of scientific index reference based on practical experience in the parameter setting process, which may lead to the loss of important variables or the introduction of unnecessary parameters, the complexity of

the model is reduced. Secondly, the hypothesis in the research process is that the brand pays the salary of the live broadcast platform according to the number of items sold, there are also such as the participants bounded rational assumptions, live with goods goods, the way is not comprehensive enough, and so on, looking forward to further in the follow-up study.

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