



# Intelligent recommendation of live broadcast script based on CHAID algorithm

Kuotai Tang<sup>1,a\*</sup>, Chen Mengrong<sup>2,b</sup>, Ying He<sup>3,c</sup>, Hailing Duan<sup>2,d</sup>

<sup>1</sup>Department of Business Management, Fujian Polytechnic of Information Technology, Fuzhou, China

<sup>2</sup>School of Cultural Tourism and Public Management, Fujian Normal University, Fuzhou, China

<sup>3</sup>School of Internet Economics and Business, Fujian University of Technology, Fuzhou, China

<sup>a</sup>\*3224243499@qq.com

<sup>b</sup>1151381069@qq.com

<sup>c</sup>754216880@qq.com

<sup>d</sup>806110064@qq.com

**Abstract.** Under the rapid maturity of 5G, live broadcast goods controlled by live broadcast scripts to form specific live "fields" are booming. The scope of live scripts has comprehensive factors such as personnel, anchors, goods, atmosphere, scenes, and promotion, and combined with the application of artificial intelligence recommendation, it has attracted the attention of consumers and operators. This paper constructs research variables based on SOR theory, conducts a questionnaire survey, and collects 610 valid samples. Secondly, reliability test was conducted. Cronbach alpha=0.913 (>0.9), validity test KMO=0.869 (>0.8), indicating that the research model has the significance of in-depth research. Finally, CHAID algorithm is used to build an intelligent recommendation model, and consumer habits, anchor style and live broadcast atmosphere variables are taken as the research objectives of the model and analyzed. The results show that: consumers' trust in anchors will trigger consumers to use coupons, but coupons will not directly trigger consumers to buy; Consumers' behavior of sharing comes from their subjective perception of live broadcast. The funny live broadcast atmosphere can best improve consumers' purchase desire and trigger purchase behavior; The noisy live broadcast atmosphere of passion can lead to the herd buying psychology of consumers and increase the purchase conversion rate of live broadcast.

**Keywords:** Live broadcast; Live script; SOR theory; CHAID

## 1 Introduction

The 51st Statistical Report on China's Internet Development released by China Internet Network Information (CNNIC) shows that as of December 2022, the number of Internet users in China has reached 1.067 billion, an increase of 35.49 million compared with

December 2021, and the Internet penetration rate has reached 75.6% (CNNIC, 2023). The scale of online shopping users in China has increased significantly, and the "home economy" has become a market hot spot. The number of live streaming users with goods has surged rapidly, and the live streaming e-commerce industry has also developed vigorously [1]. The increase in the number of live shopping and the change of purchase decisions based on different live streaming situations are difficult to clearly define the effects of these factors on online shopping groups. Therefore, the use of accurate intelligent algorithms to recommend and filter a large number of complicated information for users, so that consumers based on the habit, preferred anchor style and live atmosphere, access to more interesting and useful content.

### 1.1 Anchor style

Live streaming e-commerce highlights the interaction and common emotions between anchors and their audiences, combines people, items and sales scenarios, and realizes the shortening of the supply chain through anchors' real-time commodity explanation and consumer interaction, improves the expectation of product perceived value, and affects consumers' purchase intention. Scholars believe that in the field of radio stations, the more prominent and personalized hosting style anchors have, the more they can attract audiences. This is conducive to anchors using their own characteristics to improve the popularity of programs and gain more loyal listeners [2]. This paper divides the anchor style into product explanation type, display experience type, experience sharing type, performance type and guest type, as shown in Table 1.

**Table 1.** Type of e-commerce anchor

<i>Anchor style</i>	<i>E-commerce characteristics</i>
<i>Product explanation</i>	Through the introduction of the anchor, the product function, characteristics and appearance are described in detail to consumers. The knowledge introduced by the anchor is like a shopping guide, usually selling jewelry, electronic products and other goods.
<i>Display experience</i>	Anchors display products vividly through wearing and direct use, usually selling clothing, makeup and other daily necessities.
<i>Experience sharing</i>	By sharing knowledge of makeup and dressing techniques, such as painting, film editing, spoken English, etc., to reach the audience and sell goods with paid links.
<i>Performance</i>	By hyping the atmosphere, show the friendly style. Anchors cooperate with theme marketing and use various styles of props and costumes, which are specifically manifested as eating broadcast shows and Cosplay shows.
<i>Guest</i>	By inviting star guests, or visiting the broadcast room, to chat and chat to carry out products, by the prestige of guests, endorsement for the brand and products.

## 1.2 Live atmosphere

From the perspective of marketing, atmosphere is a kind of shopping environment formed by field construction, which can make consumers have emotional effects and increase their purchase rate [3]. This paper holds that shaping the atmosphere of live broadcast and combining people, goods, information and scenes in an interactive way can create scene-oriented and play-based marketing. With the maturity of 5G technology, AR/VR technology and artificial intelligence technology, the content of live broadcast will be more interactive and richer [4].

According to different live broadcast atmosphere, it is divided into funny type, chatting type, stable and quiet type, passionate and noisy type, and talent show type, as shown in Table 2.

**Table 2.** Live e-commerce atmosphere type

<i>Live atmosphere</i>	<i>E-commerce characteristics</i>
<i>Funny</i>	The live broadcast is mainly humorous and interesting.
<i>Chatting</i>	Step by step, the interaction between anchors and audiences is very good.
<i>Stable and quiet</i>	Live broadcast process is slow and detailed introduction of products, anchors will not shout products, less live routine.
<i>Passionate and noisy</i>	Live fast rhythm, many people enthusiastically introduce products, anchors and assistants passionate hunger marketing.
<i>Talent show</i>	The live broadcast rhythm is fast, and the anchor attracts the audience with personal charm.

## 1.3 Script and field

The live field makes excellent use of the uniqueness of the script. The audience of the e-commerce live broadcast room is not only the consumers, but also the "supporters" in the live broadcast script, that is, the members of the live broadcast team, which has derived the Internet celebrity economy, the live broadcast team model and the diversified live broadcast with goods, and thus the "script" live broadcast has been transformed into a channel for commodity sales [5]. It is generally believed that the four essential elements of successful live streaming e-commerce are anchors, users (demand side), commodities (supply side), and scripts, and the specific correlation between the four elements. In this paper, "script" is defined as a content specification setting applied to the field of live streaming e-commerce, and the elements to achieve scene interaction are as follows:

- The anchor is the core element of opening a successful live broadcast.
- The user is the vertical audience of a live e-commerce.
- Commodities as the supply side is the basis of a live broadcast.

- The script is the key to control the live broadcast plot and form a specific "field", while the anchor, user and goods form a live broadcast "field" based on the interaction of the scene.

## 2 Theoretical model

### 2.1 Field-habit theory

From the perspective of media situation theory, live broadcasting constructs the situation information system more deeply and forms a specific communication scene. This specific new communication scenario can promote the integration of audience groups, information receiving order and public and private situations, so that consumers' specific behaviors can be promoted. Live broadcast eliminates the boundaries of space and places the anchors and users in the live broadcast room in an interactive and intensive social communication situation. The real-time interaction between the host and the user creates a live broadcast "field" virtually according to the established live broadcast script, which strengthens the transmission power of information and makes the live broadcast of selling goods more vertical and concentrated [6].

### 2.2 SOR theory

Based on the perspective of environmental psychology, scholars Mehrabian and Russell (1974) innovatively put forward SOR theory (Stimulus-Organism-Response), arguing that internal and external environment stimuli affect people's emotional evaluation and then determine their behavioral responses [7].

SOR model is composed of stimulus, organism and behavioral response, indicating that consumers' buying behavior is caused by stimulus, which comes from both physiological and psychological factors inside the consumer's body and external environment. Under the stimulation of various factors, consumers generate motivation, and under the motivation, they make the decision to buy goods, implement the purchase behavior, and also evaluate the purchased goods and related channels and manufacturers after purchase.

- Stimulus (S): Drivers in the shopping environment that may affect the cognitive awareness and emotional/emotional processes of consumers. When consumer behavior is described as a stimulus-organic-response system, the stimulus is "something external to the individual," consisting of marketing mix variables and other environmental inputs.
- Organism (O): The internal processes and structures of the individual between the stimulus and the final action or response, consisting of perceptual, mental, sensory, and thinking activities, specifically human emotions and cognition.
- Response (R): The final behavior after the output result or consumer reaction, including psychological reaction, such as attitude or behavioral reaction.

At present, the application of SOR theory mainly focuses on the research of consumer behavior, user continuous use behavior and information behavior. Therefore, this paper holds that the stimulus, organism and response factors of SOR theory can be used as the theoretical basis for studying consumer behavior and dividing research variables.

### 2.3 Intelligent recommendation

Intelligent recommendation refers to the scientific processing of massive data through the use of information analysis technology, so as to analyze the user's preferences. Different information screening needs correspond to different recommendation content. Balabanovic M et al. (1997) pointed out that the content recommendation system is based on the user's previous behavior model. Therefore, the system can extract the information that users are interested in and dislike from the previous user data, so as to make corresponding recommendations [8].

## 3 Method

### 3.1 Research model

In this paper, SOR theory is used to build a research model to clarify the relationship between live streaming scripts and live streaming e-commerce. The model shows the stimulus factor, the body reaction factor and the reaction result factor of consumers' purchasing behavior. These three factors work together with the basic attribute factor of consumers under the frame of live broadcast script. Finally, CHAID algorithm is used to build an intelligent recommendation model for live broadcast scripts, as shown in Figure 1.

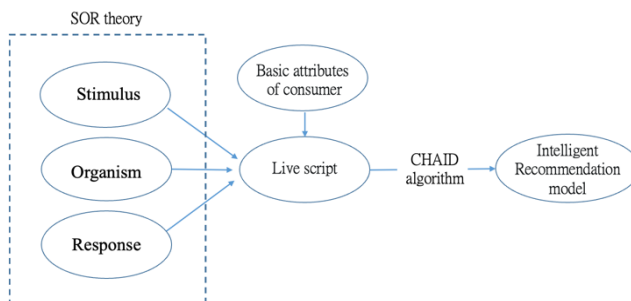


Fig. 1. Research model diagram

### 3.2 Study variable

In this paper, consumer habits, anchor style and live broadcast atmosphere (live broadcast style) are taken as the stimulus factors for consumers' purchasing behavior, users' actual feelings about live broadcast delivery are taken as the body reaction factors, and consumers' perceived value and purchasing behavior are taken as the reaction result

factors to further explore the matching relationship between differentiated consumer preference data and live broadcast scripts, as shown in Table 3.

**Table 3.** Study variable

<i>Class</i>	<i>Subdimension</i>	<i>Index</i>	<i>Source</i>
<i>Stimulus</i>	<i>Consumer habitus</i>	Consumers can generate positive feedback on future behavior through consumption experience [9].	Chen Lei, 2016; Wang tong, 2020
	<i>Anchor style</i>	Consumer purchasing behavior is influenced by the style attributes and unique charm of anchors [10].	
	<i>Live atmosphere</i>	Consumers watch live sales and care about shopping as well as fun [10].	
<i>Organism response</i>	<i>Live promotions</i>	Promotions can stimulate purchases through low prices and other offers.	Wang Tong, 2020
	<i>Live interactivity</i>	The interactive nature of live broadcasting is an important factor influencing consumers' experience and trust.	
	<i>Live content</i>	Users watching live sales can obtain detailed product information and knowledge, which is high-quality content.	
	<i>Anchor popularity</i>	To enhance the purchase intention of fans of live sales, anchors need to show strong personal characteristics in popularity, product depth and innovation.	
<i>Reaction result</i>	<i>Anchor trust</i>	When consumers watch live sales, they have more trust in the goods recommended by the anchor, and the purchase decision will be stronger.	Guo Na, 2022; Qin Yan, 2020
	<i>Professional anchor</i>	The strong professional performance of anchors makes consumers trust.	
	<i>Perceived value</i>	Consumers' perceived service value can positively affect their purchase intention and future use intention, and higher perceived service value will enhance consumers' purchasing power [11].	
	<i>Purchase decision</i>	Consumer behavior is driven by motivation and is a kind of motivational behavior [12].	

### 3.3 Questionnaire survey

Live broadcast script is the field formed by the interactive behavior between users and anchors. The field is composed of user behavior stimulus factor, organism factor and response factor. The stimulus factors include consumer habits, anchor type attribute and live broadcast style attribute; The organism factors include the interactive behavior between the host and the user, such as the preferential promotion of the live broadcast, the interaction of the live broadcast, the quality content of the live broadcast, the popularity of the host, the trust degree of the host and the professionalism of the live broadcast. The response factors include consumers' perceived value and their final purchase behavior. From three dimensions step by step, from shallow and deep mining user purchasing behavior, as shown in Figure 2.

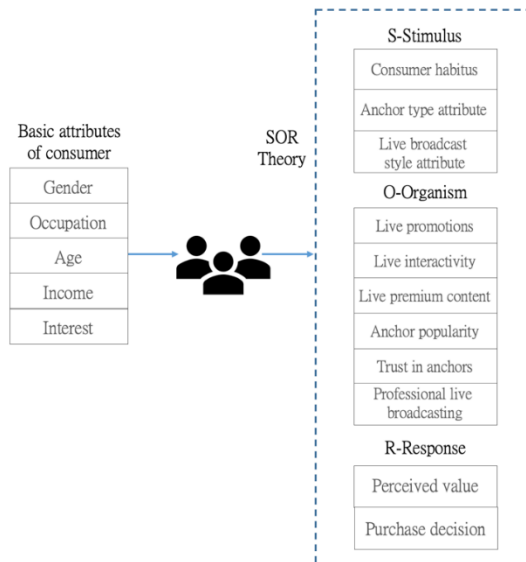


Fig. 2. Questionnaire design for matching users and scripts

This paper sent questionnaires online from May 1 to May 12, 2022. A total of 610 valid questionnaires were collected, with 185 males accounting for 30.3% and 425 females accounting for 69.7% of the sample. 590 people aged between 18 and 40 accounted for 96.7%. Most of the respondents are mainstream consumer groups, with fixed sources of economic income and independent economic ability, and have relatively distinct consumption preferences. In the data, overseas IP, users who have not been exposed to e-commerce live broadcasting, and incomplete data are excluded, and then the variables of consumer habits, anchor style, and live broadcasting atmosphere are taken as targets to build the CHAID decision tree model.

### 3.4 Reliability and calibration test

After data cleaning, SPSS Modeler was used to test the data, and KMO and Bartlett sphericity tests were adopted. In the extraction of model data, principal component analysis and maximum variance method were selected to rotate the model, output the rotation solution, set the maximum convergence iteration number to 25, and obtain KMO = 0.869 (>0.6), indicating that the correlation between variables is strong, the data is very suitable for extracting information, and has good structural validity. The explanation rate of the 39th factor in the component column reached 90.69%, indicating that the effect was acceptable and there was no need to adjust factor data. Secondly, Cronbach's Alpha=0.913, and the Alpha coefficient of each variable is above 0.9, indicating that the selected measurement indicators have good internal consistency, and each test indicator has a certain explanatory power to the variables, as shown in Table 4.

**Table 4.** Cronbach Alpha and KMO

Items	Validity Test		Reliability Statistics	
	<i>KMO</i>	<i>Bartlett's Test P-value</i>	<i>Cronbach α</i>	<i>Cronbach's sabased on stand-ardized items</i>
62	.869	.000	.913	.854

### 3.5 CHIAID decision tree algorithm

Decision tree algorithm is a typical method in data mining and has been widely used in various fields. In this paper, CHAID (Chi-squared Automatic Interaction Detection) algorithm, namely Chi-square automatic interaction detection method, is used to process existing data and generate readable rules and decision trees by induction algorithm. A decision tree is a tree with decision rules, it is composed of nodes and directions, so we can use the decision tree to predict the class and value of unknown samples.

In this paper, the model parameters of CHAID algorithm were set as follows: the maximum depth of the tree was 5, the minimum number of records in the parent branch was 2.0, and the minimum number of records in the sub-branch was 1.0. Set the significance level at which input variables can be combined to 0.05. This means that when the probability p-value of the test statistic is greater than 0.05, if the grouping of the current input variable has a significant impact on the value of the output variable, it cannot be merged, and vice versa. Use the Bonferroni method to adjust the important values, with the expected cell frequency change set to 0.001 and the maximum number of convergent iterations set to 100.

Chi-square Test: When the observed value is exactly consistent with the expected value, the  $\chi^2$  value is 0; The closer the observed value is to the expected value, the smaller the difference between the two, and the smaller the  $\chi^2$  value. Conversely, the greater the difference between the observed value and the expected value, the greater the difference between the two, and the greater the  $\chi^2$  value. Where  $A_i$  is the observed value of  $i$ ,  $n$  is the total, and  $p_i$  is the expected value of  $i$ , the formula is as follows:



$$X^2 = \sum_{i=1}^k \frac{(Ai - npi)^2}{npi} \tag{1}$$

## 4 Discussion

### 4.1 Consumer habits

Consumer habitus is one of the stimulating factors for the study of consumer behavior in live streaming e-commerce. With the four themes of "watching fixed broadcast rooms, buying products with coupons, comparing prices when shopping, and recommending to relatives and friends" as the target group, the sample number is 312, and the CHAID decision tree is obtained as shown in Figure 3, and the exploration results are as follows:

1) Famous anchors are regularly watched: Popularity of anchors is the biggest factor influencing consumers' weekly live stream viewing rate. The more influential anchors are, the more users tend to watch fixed broadcast rooms.

2) Large coupons will not directly cause purchase behavior: consumers will directly use the coupons issued by the anchor, resulting in purchase behavior.

3) Consumers' commodity price comparison behavior is widespread: commodity price comparison is widespread, and promotion activities should pay attention to quality and popularity of anchors.

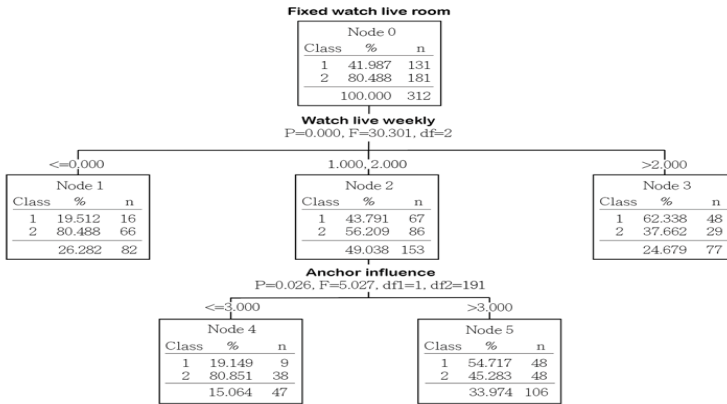


Fig. 3. Famous anchors are regularly watched

### 4.2 Anchor style

The live broadcast script interacts with characters, scenes, audio, dialogue and other elements, and forms a "field" according to the plot controlled by the established "script". The three themes of "basic attributes of consumers, role of anchors, and live broadcast atmosphere" were matched with the five anchor types of "explanatory type, display type, performance type, guest type, and sharing type". The sample number was

312. The CHAID decision tree is obtained in Figure 4, and the exploration results are as follows:

1) Users who prefer interpretive anchors do not like a stable and quiet atmosphere: Most consumers who choose interpretive anchors do not prefer a stable and quiet live atmosphere.

2) Users who prefer display anchors like the chat atmosphere: such anchors are more able to enable consumers to understand the product in detail through language actions.

3) Users who prefer sharing anchors like expert hosts: the stable live broadcast atmosphere and the support of industry experts can improve consumers' trust in live broadcast products.

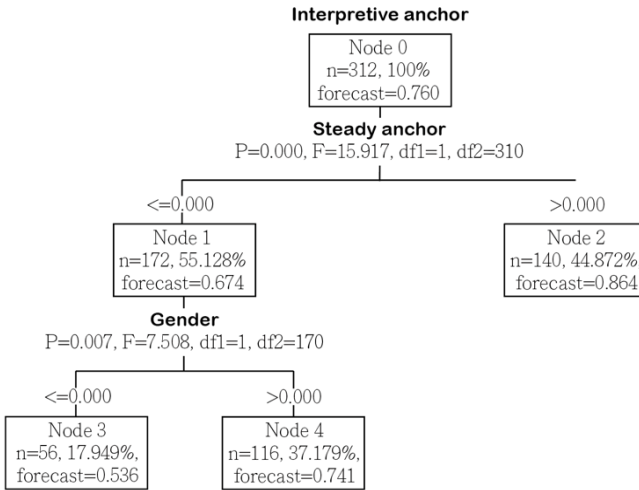


Fig. 4. Decision tree of interpretive anchor

### 4.3 Live atmosphere

The three live broadcast atmospheres of "funny, stable and passionate" are matched with consumer behavior. The chat and talent atmospheres model, because of triggering the stop rule "the minimum record of the subbranch shall not be less than 1%", prohibit all tree growth, and determine that there is a lack of correlation between the target and the predictor variable, terminate the discussion of the model. The CHAID decision tree is obtained in Figure 5, and the exploration results are as follows:

1. The funny live broadcast atmosphere is the most likely to trigger purchase behavior: This kind of atmosphere is based on the positive perceived value of consumers, who like, comment, swipe gifts and purchase behaviors of high popularity of anchors.
2. The stable atmosphere causes attention to the popularity of anchors: in the drafting of a "stable and heavy" live script, popular anchors should be selected, or the

uniqueness of the live broadcast room should be increased by transforming the scenery and the means of speech to achieve the purpose of drainage.

3. Passionate atmosphere can trigger herd buying psychology: Passionate live broadcast atmosphere can improve consumers' desire to buy and increase the conversion rate of live broadcast.

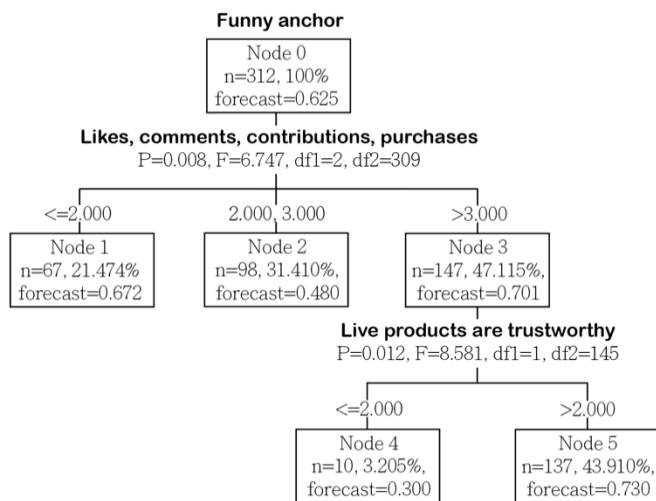


Fig. 5. CHAID decision tree of funny live broadcast

## 5 Conclusions

Through the analysis of three types of CHAID models, this paper studies the biggest influencing factors of consumer habits, anchor style and live broadcast atmosphere on the formation of a successful live broadcast e-commerce and its "field". Live broadcast scripts associate anchors, users, and products to promote the interaction and cooperation of various elements, forming specific communication and marketing scenarios in this live broadcast context, and further contributing to the generation of consumer behaviors.

1) Habit of consumers: Consumers' trust in anchors will trigger consumers to use broadcast room coupons, while coupons will not directly trigger consumers to purchase; Consumers' recommendation behavior to relatives and friends results from their subjective perception of live broadcasting. The frequency of consumers' price comparison behavior is affected by the popularity of anchors and the quality of commodities. Consumers' behavior of recommending live broadcast rooms to relatives and friends depends on their professional recognition and trust of live broadcast.

2) Anchor style: Anchor popularity is strongly correlated with live broadcast effect, and the user retention rate, trust rate and click rate of high-profile anchors are better than other anchors; The professional degree of the anchor role is directly related to the

purchase conversion rate of live broadcast. The style of the anchor is highly related to the live content and the audience.

3) For live broadcast atmosphere: The construction of differentiated live broadcast atmosphere can shape the positive perceived value of consumers through the design of scenery and speech; The funny live broadcast atmosphere can best improve consumers' purchase desire and trigger purchase behavior; The stable live broadcast atmosphere causes consumers to pay attention to the popularity of anchors; The passionate live broadcast atmosphere can trigger the herd buying psychology of consumers and increase the purchase conversion rate of live broadcast.

## Acknowledgment

The author would like to thank the anonymous reviewers for their valuable comments. This study was supported by the 2022 Taiwan teacher introduction and practice research project of Fujian province [No. HX2022029].

## References

1. Li Wei, Fan Chongjun, Zhang Shun. Market analysis of live streaming e-commerce in the context of leapfrog development [J]. *China Price*, 2022, 03: 115-7
2. Znanq Jia. The Cultivation of Individualized Hosting style of radio anchors [J]. *Cradle of Journalists*, 2019, 12 (in Chinese): 123-4.
3. Yang Miao. Study on the evolution of broadcasting style of TV political News anchors [D]; Henan University, 2021.
4. Zhang Jia. The Cultivation of Individualized Hosting style of Radio anchors [J]. *Cradle of Journalists*, 2019, 12: 123-4.
5. Tang Y. Immersion, Interaction and revelry: A study on the phenomenon of "script" in short video platform live selling [J]. *Audiovisual*, 2021, 12: 145-6.
6. Liang Yong. Habit and Habitus: A difference between the old and the new analytical empirical law Fields [J]. *Journal of Hubei Police College*, 2014, 27(02): 67-9.
7. MEHRABIAN A, RUSSELL J A. An Approach to Environment Psychology [J]. MIT, 1974,
8. BALABANOVIC M, SHOHAM Y. Fab: content-based, collaborative recommendation [J]. *Communication of the ACM*, 1997, 40(3): 66-72.
9. Chen Lei. Relationship, Structure and Habitus: Field Theory's Interpretation of academic anomie [J]. *Higher Education Exploration*, 2016, 02: 5-10.
10. Wang Tong. Study on consumers' purchase intention in the context of e-commerce live streaming [D]; Minzu University of China, 2020.
11. Guo Na, Zhou Aoshuo. Research on Influencing factors of consumers' intention to use community group-buying based on perceived value [J]. *Business Economics Research*, 2022, 04: 73-6.
12. Qin Yan. Study on Influencing factors of purchasing behavior of community e-commerce consumers based on Motivation theory [D]; Jinan University, 2020.

**Open Access** This chapter is licensed under the terms of the Creative Commons Attribution-NonCommercial 4.0 International License (<http://creativecommons.org/licenses/by-nc/4.0/>), which permits any noncommercial use, sharing, adaptation, distribution and reproduction in any medium or format, as long as you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons license and indicate if changes were made.

The images or other third party material in this chapter are included in the chapter's Creative Commons license, unless indicated otherwise in a credit line to the material. If material is not included in the chapter's Creative Commons license and your intended use is not permitted by statutory regulation or exceeds the permitted use, you will need to obtain permission directly from the copyright holder.

