

## Article

# Enhancing Sales of Green Agricultural Products through Live Streaming in China: What Affects Purchase Intention?

Shi Zheng <sup>1</sup>, Xinyang Lyu <sup>1</sup>, Jie Wang <sup>1</sup> and Cheryl Wachenheim <sup>2,\*</sup> 

<sup>1</sup> School of Agricultural Economics and Rural Development, Renmin University of China, Beijing 100872, China

<sup>2</sup> Agribusiness and Applied Economics, North Dakota State University, Fargo, ND 58101, USA

\* Correspondence: cheryl.wachenheim@ndsu.edu

**Abstract:** Live streaming of agricultural products can reduce farmer losses caused by unsalable agricultural products and increase the income of farmers. Live streaming can be especially effective for green product sales as it can increase viewer understanding of and interest in the production and attributes of green products. Using the stimulus, organization, and response theoretical framework, this paper explores the influence of agricultural products anchors' characteristics on consumers' purchasing behavior and the mediating effect of green consumption cognition. The data come from surveys distributed online to Chinese shoppers who had participated in an agricultural livestreaming event. A total of 691 valid responses were received. Anchor characteristics of influence, sales promotion, and interactive entertainment were found to positively impact consumers' purchasing behavior. Green consumption cognition, composed of environmental problem perception and green consumption awareness, has a positive impact on purchasing intent. Furthermore, anchor characteristics of influence and sales promotion can positively influence consumers' purchasing behavior indirectly through green consumption cognition.

**Keywords:** live streaming; agricultural products; anchors; purchase intent; green consumption



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## 1. Introduction

Since 2010, with the popularization of mobile 5G technology and the rapid development and adoption of internet technology, China's internet digital economy has boomed through e-commerce. Recently, e-commerce live streaming has moved to the forefront of online shopping. Live streaming is a form of e-commerce that involves real-time social interaction between an anchor and viewers and can also include participant-to-participant interaction. Live streamers add value to both products and the viewer purchasing experience. Using live streaming, an anchor can expand the traditional online offering of products and product information to include video offerings and interviews that show product use and the place and way in which the product was produced [1]. For example, live streaming of agricultural products may include interviews with farmers producing the product, a tour of their farm, and details of production practices used. Viewers are often invited to provide comments or ask questions during the broadcast on a bullet screen. Bullet screens are popular in China, particularly among younger individuals. They are often used to express virtual reactions and have been incorporated into many venues including movies and livestreaming e-commerce. During livestreaming events, bullet screens allow viewers to ask questions and comment. This type of active participation in the livestream event not only provides viewers additional information about products but offers them a sense of inclusion, which has been shown to increase intention [1,2]. E-commerce live streaming often includes promotions, which can include events such as random rewards offered through mobile payment applications, special deals, and viewer games resulting in a reward.

Especially since the COVID-19 pandemic, growth in transaction volume in the livestreaming environment in China has accelerated. To exploit the trend of consumers' shopping

habits shifting to online, many brands have launched livestreaming rooms, selling goods on e-commerce platforms. Live streaming can lead to increased consumer demand by expanding the market for products, creating a sense of connection for customers and the ability to interact within the livestream community, and providing additional product information to viewers as they ask questions [1,3–5]. In effect, live streaming enhances the shopping experience and motivates purchasing by viewers.

The growth in e-commerce live streaming and viewership has been characterized as staggering [6]. According to the 49th Statistical Report on the Development of China's Internet Network by the China Internet Network Information Center (CNNIC), as of December 2021, the scale of online shopping users in China was 842 million, and the scale of online livestreaming users was 703 million. Among them, the scale of e-commerce livestreaming users was 464 million, a year-on-year increase of 75.79 million or 19.5%. This emerging marketing model has greatly improved user experience over traditional forms of e-commerce [7].

At present, many e-commerce platforms, such as Amazon, Shopee, Lazada, and Douyin, have launched livestreaming functions in various countries and regions. Live streaming of goods on these platforms has entered many countries, but user acceptance and proliferation varies [8]. Among them, the growth rate of users in China's livestream shopping market is extraordinary. During the COVID-19 epidemic, the livestream shopping market, which enables consumers to place orders without leaving home, has been favored by more and more consumers. Compared with China, the market of live streaming in other countries has developed more slowly. Taking the United States as an example, according to the data of Coresight, a research institution, the scale of livestreaming e-commerce in the United States was less than USD 1 billion in 2019. By contrast, the online transaction volume of China's Kuaishou livestreaming e-commerce in 2019 reached RMB 59.6 billion. In a survey conducted by Ipsos Malaysia, 82% of respondents said they had used Shopee in the last six months, which extrapolates to 15.6 million Shopee users also watching live shopping on the platform [9].

Similarly, live streaming of agricultural products is also developing rapidly in China, which is related to talent training of livestreaming anchors and participation of distributors moving agricultural products throughout the marketing channel. China's Douyin e-commerce released a report on the Power of Douyin E-commerce in Rural Development during the 2022 Harvest Festival. It pointed out that from September 2021 to September 2022, a total of 2.83 billion agricultural products went out to cities through Douyin e-commerce, and a large number of hosts, including the first party secretary of the village, villagers, and young people returning to their hometowns, emerged on the livestreaming platform. At present, China's livestream market of agricultural products is developing rapidly, but there are still problems such as unsound regulations, while other countries' livestream markets of goods and agricultural products remain to be developed.

### *1.1. Agricultural Goods Live Streaming*

Of particular interest, live streaming has become an important venue for the sale of agricultural goods, and this has been an orchestrated effort. The construction of modern agriculture, transformation of agricultural development methods, and promotion of agricultural industry upgrading have been written into recent No. 1 Central Documents [10,11]. At the Symposium on Victory in Poverty Alleviation, General Secretary Xi Jinping pointed out that it is necessary to effectively solve the problem of unsalable agricultural and live-stock products for poverty alleviation, organize production and sales connections, carry out consumption poverty alleviation actions, use the internet to expand sales channels, and solve the problem of difficult sales of agricultural products through multiple channels.

Introduced as early as 2013 [12], by 2015, livestreaming sales of agricultural products began to emerge. Growth quickly accelerated during the COVID-19 pandemic, which substantially reduced access for farmers to existing logistical channels, resulting in large quantities of unsalable perishable goods to stockpile at or near their point of origin [13].

The year-on-year growth rate of livestreaming agricultural product sales was 11.3% from 2020 to 2021 [14]. The unique e-commerce livestreaming venue for agricultural products has served as a relatively low-cost means to stimulate consumption and improve user experience [15], reduce information asymmetry, [4], reduce transaction costs, and increase farmer profits [16]. Local live streaming can also work to improve government image and grow trust in local governments [17].

### 1.2. Participants in Agricultural Livestream Marketing

The Chinese government built the basic hardware for agricultural e-commerce live streaming and provided anchor business guidance for local e-commerce associations. E-commerce platforms have carried out agricultural product live streaming and increased the income of participating local farmers. Leadership has come from top-level anchors, including influential internet celebrities, film and television stars, mainstream media, and local administrators. The important role of the latter in promoting live streaming and, at times, having a local government official serve as the anchor, is rather unique to the live streaming of agricultural products. By opening livestreaming rooms to sell agricultural products, actively promoting the online live streaming sales of agricultural products, and creating characteristic brand agricultural products, participants have created a stronger agricultural market and progressed the national mission of rural revitalization [3].

With rural life as the background, internet celebrity anchors who have many fans, such as Li Ziqi and Dianxi Xiaoge, show their lifestyles during a live feed to influence viewers' purchasing decisions. Most of the anchors carrying agricultural products are grassroots, and the live streaming is close to the content of public life. As such, the audience in the livestreaming room has little psychological distance from the group of internet celebrity anchors, and it is easier to establish psychological resonance and a sense of identity with the anchors [18].

Various e-commerce platforms have also responded to the call of the central government to open livestreaming sales channels for agricultural products. For example, as a leading e-commerce platform company, Taobao launched the *County Head is Coming* livestreaming room of agricultural products in January 2019. The county head or grassroots cadres act as the anchors of the livestreaming room to sell agricultural products produced by local farmers. Taobao subsequently launched the *Village Broadcasting Project* in March 2019. Representatives of several provinces and cities jointly announced the launch, and many livestreaming events of the project have achieved sales of more than RMB 10 million. In the *Kuaishou Poverty Alleviation E-commerce Activity*, 97 anchors participated in the livestreaming selling of agricultural products, benefiting 160,000 people and helping impoverished areas reduce poverty. During the *Double Eleventh*, CCTV and Pinduoduo set up a large-scale live commerce special campaign to promote the sales of high-quality agricultural products. Driven by emerging e-commerce livestreaming platforms such as Taobao, Pinduoduo, and Douyin, livestreaming sales of agricultural products have exceeded growth expectations. In addition, growing involvement of professional farmers engaged in the production and sales of green agricultural products has the potential to be an important driving force for China's agricultural modernization and rural revitalization.

### 1.3. Problem Statement

Despite the growth and promise of live streaming of agricultural products and the emerging associated literature, there is still limited research on live streaming of agricultural products [17,19] and especially on the role of the unrealized potential of expanding the green product market. Investigating factors influencing success of agricultural green product marketing through livestreaming, and especially the role of green cognition, is warranted. Many consumers have a relatively limited and superficial understanding of agricultural production practices, especially green practices, and of the relationship of these production practices to the environment, human health, food safety, and food quality [20]. Live streaming is particularly well-suited to providing this information and in a format

that continues to attract viewer attention so they are open to learning. Livestreaming anchors can show farmers, farms, and production and handling practices as they occur and exploit the opportunity to show the relationship between production practices and the wider environment, increasing consumer trust in the featured products, as well as in green practices more generally [20,21].

Furthermore, few scholars have investigated consumer behavior during agricultural products live streaming and there is a lack of specific research on the influencing factors between the characteristics of agricultural products anchors and consumers' purchasing behavior. To contribute to our understanding of what makes agricultural live streaming successful, this paper studies consumer purchasing influencers in the live streaming of agricultural products, including agricultural product anchors. This information will inform those involved in planning and implementing livestream events and facilitate the formation of targeted marketing strategies. It may also inspire e-commerce platforms to consider sustainable development of agricultural product sales, which can play an important guiding role in the live streaming of agricultural products on the e-commerce platform, increase sales of agricultural products, further develop agricultural live streaming, and contribute toward rural revitalization.

## 2. Theoretical Framework and Research Hypotheses

### 2.1. Theoretical Framework

Stimulus-organism-response theory (SOR) is based on the traditional SR theory (stimulus-response) proposed by Watson [22]. Added is an analysis of the psychological activity of the organism to explain the influence mechanism between the stimulus and the individual's response behavior. SOR was proposed by Mehrabian and Russell [23]. Stimulus refers to external factors that affect the individual and organism to the internal factors that affect the individual. Response is the resulting intended or actual behavior. Eroglu [24] first applied the SOR theoretical model to e-commerce, and the model was widely used in subsequent studies. Moon et al. [25] used SOR theory and two-dimensional attitudes to explain the influence of consumers' attitudes and intentions on online shopping under the stimulation of utilitarian attributes and hedonic attributes. Tu and Zhu [5] used SOR theory in finding that external cues can affect consumers' willingness to purchase agricultural products online, while perceived risk and positive emotions play a mediating role. The SOR theoretical framework has also been employed to investigate the mediating role of consumer's green factors on purchase intent. Gil and Jacob [26] employed the SOR framework to investigate the mediating effect of green satisfaction and trust on purchase intention. Ahmed and Zhang [27] investigated the effects of service quality and consumer's green perceptions on purchase behavior.

Scholars have used SOR theory to analyze purchasing behavior specifically during e-commerce live streaming. Li et al. [28] used SOR theory to investigate if social presence in e-commerce live streaming affects consumers' impulse purchases through pleasure and arousal. Sun et al. [29] used the SOR theoretical framework to explore the influence of e-commerce livestreaming scene characteristics on consumers' purchase intention. Their results show that scale of sales promotion and anchor characteristics affect consumers' emotional experience and, thus, affect impulse purchase intention. Recent research has applied the SOR framework to agricultural live streaming. Guo and Sun [17] applied the SOR framework to examine how livestreaming platform information quality, bullet screen mutuality, and the trustworthiness of anchors influenced perceived information usefulness and interest and, thus, purchase intention. They used impulsiveness as a moderating factor. Dong et al. [20] investigated the influence of the quality of the live stream on green trust and, thereby, purchase intent for green agricultural products.

According to the SOR theoretical framework, in the context of the live streaming of agricultural products, this paper studies the characteristics of anchors, green consumption cognition, and the purchasing behavior of consumers. The external stimuli are the various characteristics of the anchor including influence, sales promotion, and interactive enter-

tainment. Green consumption cognition is considered to be a consumer's internal state of consciousness that must be aroused. In particular, green consumption variables representing environmental problem perception and green consumption awareness are introduced as mediating variables. Finally, the consumer accepts the anchor's recommendation, and the purchasing behavior that occurs is a reaction after being stimulated. Different from the offline consumption mode, the e-commerce platform creates a virtual online consumption environment for live anchors and consumers. The anchors can use their powerful influence to create an atmosphere of entertainment and interaction in the livestreaming room in real time, delivering one or more pleasing sensory stimuli to increase fans' trust and inspire them to place an order for recommended products.

## 2.2. Research Hypotheses

Existing research on consumers' purchasing behavior in livestreaming rooms is mainly carried out from two aspects, namely, consumers' individual characteristics and livestreaming quality. In terms of individual consumer characteristics, consumer goals, consumers' perceived risk, and confidence in shopping have been shown to affect purchasing behavior directly or indirectly [30]. Li and Hua [31] confirmed that remote presence and social presence can positively influence consumers' purchase intention. Trust is introduced as a central consideration in several studies and sometimes used as a mediating variable [19,21,23]. In terms of livestreaming quality, online platform access, anchor professionalism, credibility, communication skills service quality, interaction, and the experience of viewers have been shown to affect purchasing decisions [4,6,21,32,33]. This study investigates livestreaming quality through a focus on three attributes of anchors. These include anchor influence, sales promotion, and interactive entertainment.

### 2.2.1. Influence of Agricultural Products Anchors' Characteristics on Purchasing Behavior

The notion that factors triggering consumers' impulsive buying behavior, such as trust and pleasure, can be inspired by the characteristics of anchors including their influence, sales promotion, and interactive entertainment was proposed by Liu et al. [33]. These categories are adopted for the current study as independent variables.

Influence of the anchor includes popularity, professionalism, number of fans, enthusiastic public welfare image, and ability to sell goods. Tanner [34] found that a popular anchor increases consumer confidence, which in turn increases purchase intention. Professionalism of the anchor also has been shown to have a positive impact on consumers' purchase intention [35,36]. Others have found that both the popularity and professionalism of internet celebrity opinion leaders affect consumer confidence, which in turn affects consumers' willingness to buy [37,38]. The influence of the anchor can impact consumers' judgment about the quality of agricultural product information, their confidence in livestreaming content, and even cognition. There is evidence that the longer the time that an anchor has been involved in live streaming and the more income they have generated, the more influential they are [39]. Consumers are not only more likely to buy the product but learn from the anchor's selling activities. Lu [40] suggests that government official anchors can eliminate potential consumers' doubts about middlemen and can drive the development of fresh agricultural product e-commerce more than non-government official anchors. Officials' live streaming of goods can reflect economic value and public welfare and can be an effective way to revitalize the countryside [41].

The second anchor characteristic is sales promotion. With the rapid popularization of e-commerce live streaming of agricultural products, to prompt users to place orders as soon as possible, the anchor encourages users to join flash sales, draw lotteries, use coupons, and otherwise take advantage of special offers. Top professional anchors of e-commerce platforms such as Li Jiaqi and Luo Yonghao have strong delivery success by offering goods at preferential prices. Discounts can drive audiences to watch e-commerce live streaming, the core mechanism for leading anchors' success in delivery performance and attracting consumers to place orders involuntarily [42]. Livestreaming promotion prices can positively



affect consumers' willingness to buy [43,44]. In addition to strong discounts, livestreaming promotions include random lotteries and limited-time limited-product sales.

The third anchor characteristic is the interactive entertainment provided by celebrities, farmers, and government officials; that is, the anchor. During the live streaming of agricultural products, there can be two-way interactions between the anchor and the audience and between audience members, and the audience can experience the sense of pleasure in these interactions. The interactivity and entertainment of webcasting has been shown to have a positive effect on consumers' product perception and promote consumers' purchase intention [45]. More interactive anchors enhance the audience's experience and perceived trust, thereby enhancing their purchase intentions [46].

On traditional e-commerce platforms, consumers can only understand products or information through static text and images, but live streaming allows for a better understanding of the product and enhances the viewers' relationship to the product. Viewers can communicate with other viewers and ask questions of the anchor in real time, and the anchor can offer professional and individualized answers. Instant online feedback is a great stimulus for audiences, directly affecting their time in the livestreaming room and, in turn, affecting consumers' purchase intentions and behaviors. Entertaining people and activities will enhance consumers' enjoyment and have a positive impact on buyers' purchase intentions [47,48].

This paper therefore proposes the following hypotheses:

- H1.** *Influence of agricultural anchors positively affects purchasing behavior.*
- H2.** *Sales promotion of agricultural anchors positively affects purchasing behavior.*
- H3.** *Interactive entertainment of agricultural anchors positively affects purchasing behavior.*

## 2.2.2. The Influence of Green Consumption Cognition on Consumer Purchasing Behavior

Cognitive process traditionally refers to the process of understanding, which is a psychological process in which the human brain reflects on the characteristics and relationships of objective things in the form of perception, memory, and thinking [49]. Ching et al. [50] defined green consumption cognition as consumers' views and level of understanding with regards to environmental protection concepts as evidenced by surroundings, facilities, and service and hypothesized that consumers' green consumption cognition would affect their behavioral intention. Wu and Wang [51] suggested that green consumption behavior is comprised of green consumption knowledge, perception, and willingness, and environmental value behavior.

Green agricultural product refers to ecologically supporting, safe, high-quality, and high-efficiency agricultural products with particular characteristics that are produced in a specific way [52]. Products can be certified based on their attributes and production processes (e.g., green and organic). After certification, these products can be licensed to use an associated label. In recent years, China has also developed geographical indication certification for agricultural products. For convenience, the term "green agricultural products" in this paper includes agricultural products that have been certified as pollution-free agricultural products, green food, or organic agricultural products, or are qualified with the geographical indication certification.

This paper posits that green consumption cognition is a psychological process in which consumers consciously accumulate green consumption knowledge and form awareness based on their perception of environmental problems. There are thus two aspects: (1) environmental problem perception, which aims to make consumers pay attention to and understand environmental problems in their daily lives and (2) green consumption awareness; that is, after consumers understand and learn green product knowledge and green standards, they will evolve from their original consumption methods toward conscious support of green consumption behaviors. The definition and measurement of green consumption cognition in this paper is based on Ching et al. [50].

Hypotheses are as follows:

**H4.** *Green consumption cognition positively affects purchasing behavior.*

**H4a.** *Environmental problem perception positively affects purchasing behavior.*

**H4b.** *Green consumption awareness positively affects purchasing behavior.*

### 2.2.3. The Mediating Role of Green Consumption Cognition

China's green consumer market started late, with few brands, difficult quality assurance, and high prices. In recent years, quality of life has gradually improved, and the green consumption market chain has been developing rapidly, although there remains a lack of quality supervision norms and policy measures. Yu [53] pointed out that the level of consumers' green consumption cognition is proportional to cognition of the green value of products and services and plays a mediating role in the process of consumers' purchasing behavior. Li et al. [54] found that consumers' individual differences, perceptions of external stimulus, and perceptions of environmental problems all directly affect their green consumption attitudes and ultimately affect their purchasing behaviors. Therefore, it is postulated that, in the situation of the live streaming of agricultural products, the green consumption cognition composed of consumers' environmental problem perception and green consumption awareness will play a mediating role between the three dimensions of anchor characteristics and purchasing behaviors.

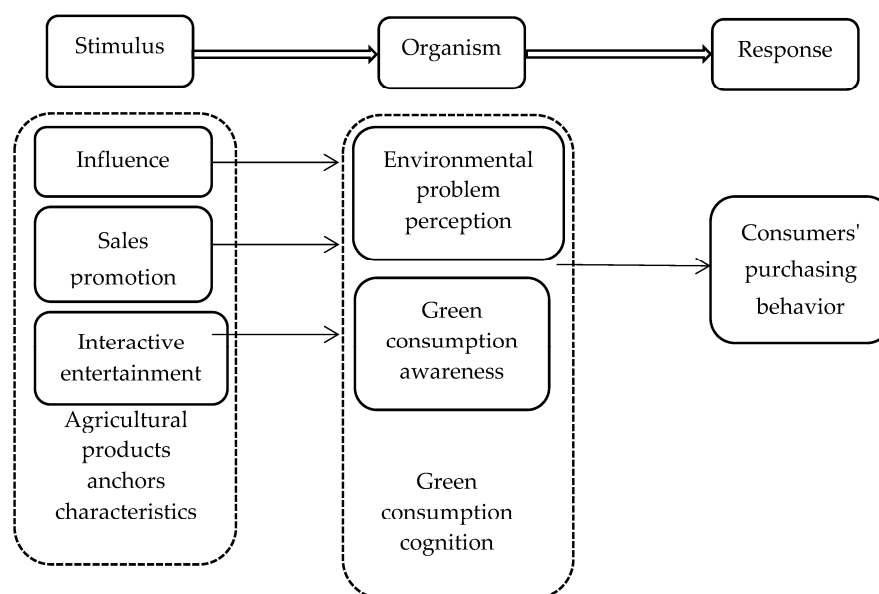
This paper proposes the following hypotheses:

**H5.** *Green consumption cognition plays a mediating role between the influence of agricultural product anchors and purchasing behavior.*

**H6.** *Green consumption cognition plays a mediating role between the sales promotion of agricultural product anchors and purchasing behavior.*

**H7.** *Green consumption cognition plays a mediating role between the interactive entertainment of agricultural product anchors and purchasing behavior.*

To sum up, this paper studies the influence mechanism between the anchor influence, sales promotion, and interactive entertainment and purchasing behavior in the live streaming of agricultural products, with green consumption cognition as the mediating variable. The research framework is depicted in Figure 1.



**Figure 1.** SOR research framework.

### 3. Materials and Methods

#### 3.1. Data Sources

This paper considers the influence of characteristics of agricultural products anchors, green consumption cognition, and other factors on purchasing behavior. An initial survey was offered, resulting in 103 surveys collected, of which 88 (85.4%) were valid. The reliability and validity of the collected data were tested, and modifications were made to the survey. Modifications included eliminating two questions to improve the reliability of the estimate, merging the interactivity and entertainment characteristics of the anchor into a single characteristic and adding a question to qualify respondents as having watched e-commerce live streaming of agricultural products.

The data used in this paper come only from the final survey. The study used the WJX, a professional online questionnaire, examination, assessment, and voting platform, to generate the questionnaire and send the website link of the questionnaire to social media such as WeChat groups and QQ groups. Respondents completed the questionnaire online. A total of 908 questionnaires were collected. Some surveys were deemed invalid because the respondents had not watched the live streaming of agricultural products. This resulted in 691 valid responses. The questionnaire collected the personal information of respondents, as well as their perceptions about characteristics of agricultural products anchors and measurements of green consumption cognition and purchasing behavior.

#### 3.2. Variable Selection

The research model and hypotheses of this paper include influence, sales promotion, and interactive entertainment of agricultural products anchors, environmental problem perception, green consumption awareness, consumer purchasing behavior. Considering the authenticity and accuracy of the measurement data, this paper refers to the definitions of related concepts by several authors to determine the corresponding scale items and makes partial revisions in combination with the situation of live streaming of agricultural products [55–57]. A scale suitable for this study is designed, as shown in Table 1. The dependent variable is the purchasing behavior of consumers. A score is calculated by factor analysis using two survey questions: frequency of purchasing agricultural products in livestreaming rooms (Q24) and percentage of agricultural products purchased online that were purchased via live streaming (Q25).

**Table 1.** Research scale.

Variable	Item
Influence of anchors	Q1 The anchor has a high reputation and influence in the field of live streaming of agricultural products
	Q2 The anchor is very professional and has rich practical experience in the field of live streaming of agricultural products
	Q3 The anchor always patiently explains the information of agricultural products and attracts me
	Q4 The anchor pays attention to self-improvement and is enthusiastic about public welfare, which attracted me
Sales promotion of anchors	Q5 I will buy agricultural products because the anchor runs a special flash sale during the live streaming
	Q6 I will continue to watch live streaming and buy agricultural products because the anchors issue livestreaming-exclusive coupons
	Q7 I will buy agricultural products because, when I place an order to buy agricultural products during the live streaming, I will receive a gift
	Q8 I will buy agricultural products because there are occasional draws during the live streaming
	Q9 I was attracted to buy agricultural products by the ‘limited time, limited purchase and limited sales’ promotion in the live streaming



**Table 1.** *Cont.*

Variable	Item
Interactive entertainment of anchors	Q10 I would like to actively participate in the interaction during the live streaming and share my shopping experience and usage experience
	Q11 The questions I have during the live streaming can be answered immediately by the anchor
	Q12 My questions in the live streaming room can be answered immediately by other consumers online
	Q13 I am relaxed and happy while watching the anchor's live stream
	Q14 I think it is interesting to watch the anchors live
	Q15 The anchor uses humorous language in the live streaming to make the livestreaming room more joyful
Environmental problem perception	Q16 I pay close attention to news reports related to the environment
	Q17 I often discuss environmental issues with my family, friends, and relatives
	Q18 I get angry when I think about the damage pollution does to plants and animals
	Q19 When I see familiar person doing something damaging to the environment, I will stop him/her
	Q20 I know which products are more environmentally friendly to buy/consume
Green consumption awareness	Q21 I think green consumption is a very meaningful thing for environmental protection
	Q22 I think green consumption is very closely related to my life
	Q23 I follow and am interested in learning more about products with environmental value
Purchasing behavior	Q24 Frequency of purchasing agricultural products in the livestreaming room
	Q25 Percentage of agricultural products purchased online that were purchased via live streaming.

Use a Likert scale from 1 (strongly disagree) to 5 (strongly agree) except for the purchasing behavior questions. For frequency of purchase, the scale is from 1 (never) to 5 (always). For the proportion of agricultural products purchased online that are purchased through livestreaming rooms, the scale is 1 = <20%, 2 = 20–50%, 3 = 50–80%, and 4 = >80%.

### 3.3. Reliability and Validity Analysis

#### 3.3.1. Reliability Analysis

Cronbach's alpha was used to test reliability. Each Cronbach's alpha was between 0.8 and 0.9, identifying the scales used as internally consistent (Table 2).

**Table 2.** Reliability analysis of each dimension.

Dimension	Cronbach's Alpha	Items
Influence of anchors	0.804	4
Sales promotion of anchors	0.846	5
Interactive entertainment of anchors	0.848	6
Environmental problem perception	0.877	5
Green consumption awareness	0.864	3
Purchasing behavior	0.805	2

#### 3.3.2. Validity Analysis

Exploratory factor analysis was used to test the construct validity of the scale. The KMO value identifies suitability of the data for factor analysis. Bartlett's test indicates whether the coefficient matrix is a unit matrix. Factor analyses were conducted for the (1) agricultural product anchor characteristics and (2) green consumption cognition scales. In the factor analysis of the agricultural product anchor characteristic scale, the KMO value of the test is 0.896, in the range of 0.8–0.9. The observed value of the Bartlett's test statistic is 5085.525, and the corresponding p value is less than 1%. The agricultural product anchor characteristic scale is thereby deemed suitable for factor analysis. Exploratory factor analysis was next carried out on the scale. The maximum variance method was

used to rotate, and the principal components were extracted if the eigenvalue was greater than 1. Three principal components were extracted, and the cumulative variance was 61.1% (Table 3). Variance contribution rates were 20.6%, 20.5%, and 19.9%, respectively. Each item has an accurate dimension division. The division results of the dimensions are consistent with the preset results, and the factor loadings are all greater than 0.5. The common degree reached the standard of more than 0.4. Thus, the agricultural product anchor characteristics scale has good structural validity.

**Table 3.** Factor-rotated component matrix of the agricultural product anchor characteristics.

Item	First Factor	Second Factor	Third Factor	Common Degree
Q5 I will buy agricultural products because the anchor runs a special flash sale during the live streaming	0.577			0.536
Q6 I will continue to watch live streaming and buy agricultural products because the anchors issue livestreaming-exclusive coupons	0.658			0.626
Q7 I will buy agricultural products because when I place an order to buy agricultural products during the live streaming, I will receive a gift	0.759			0.671
Q8 I will buy agricultural products because there are occasional draws during the live streaming	0.813			0.707
Q9 I was attracted to buy agricultural products by limited time, limited purchase, and limited sales in the live streaming	0.737			0.625
Q10 I would like to actively participate in the interaction during the live streaming and share my shopping experience and usage experience		0.575		0.547
Q11 The questions I have during the live streaming can be answered immediately by the anchor		0.762		0.629
Q12 My questions in the live streaming room can be answered immediately by other consumers online		0.748		0.63
Q13 I am relaxed and happy while watching the anchor's live stream		0.69		0.646
Q14 I think it is interesting to watch the anchors live		0.649		0.609
Q15 The anchor uses humorous language in the live streaming to make the livestreaming room more joyful		0.575		0.557
Q1 The anchor has a high reputation and influence in the field of live streaming of agricultural products			0.571	0.418
Q2 The anchor is very professional and has rich practical experience in the field of live streaming of agricultural products			0.728	0.608
Q3 The anchor always patiently explains the information of agricultural products and attracts me			0.772	0.693
Q4 The anchor pays attention to self-improvement and is enthusiastic about public welfare, which attracted me			0.743	0.663
Eigenvalue	3.10	3.08	2.99	
Variance percentage	20.64	20.52	19.94	
Cumulative variance percentage	20.64	41.15	61.10	

In the factor analysis of green consumption cognition scale, the KMO value is 0.888, in the range of 0.8–0.9. The observed value of the Bartlett's test statistic is 3239.569, and the corresponding  $p < 0.01$ . The green consumption cognition scale is therefore suitable for factor analysis. Using the same method described earlier, two principal components were extracted. The cumulative variance was 71.71% (Table 4). The variance contribution rates were 40.0% and 31.7%, respectively. Again, the division results of the dimensions are consistent with the preset results, and the factor loadings are all  $>0.5$ , indicating that the green consumption cognition scale is structurally valid.

### 3.4. Descriptive Analysis

Descriptive statistics show a balanced population with respondents showing a range within age, education, income, and employment categories (Table 5). The population is also consistent with characteristics of livestream users as reported by the New Economic Report on Taobao Live Streaming in 2020. The report indicates that male users accounted for 40% of livestreaming users in 2019, a year-on-year increase of 6%. The report indicates those 40 and older account for the greatest population of live streamers, followed by those between

30 and 40. Those younger were less likely to be involved in live streaming, although the percentage is growing.

**Table 4.** Factor-rotated component matrix of the green consumption cognition.

Item	First Factor	Second Factor	Common Degree
Q16 I pay close attention to news reports related to the environment	0.834		0.739
Q17 I often discuss environmental issues with my family, friends, and relatives	0.734		0.585
Q18 I get angry when I think about the damage pollution does to plants and animals	0.786		0.749
Q19 When I see familiar person doing something damaging to the environment I will stop him/her	0.752		0.696
Q20 I know which products are more environmentally friendly to buy/consume	0.700		0.609
Q21 I think green consumption is a very meaningful thing for environmental protection		0.843	0.799
Q22 I think green consumption is very closely related to my life		0.889	0.856
Q23 I follow and am interested in learning more about products with environmental value		0.75	0.704
Eigenvalue	3.20	2.54	
Variance percentage	40.03	31.68	
Cumulative variance percentage	40.03	71.71	

**Table 5.** Descriptive statistics of personal characteristics.

Variable	Definition	Number of People	Proportion
Gender	Male	299	43%
Age	Under 25	65	9%
	25–35	158	23%
	35–45	238	34%
	Above 45	230	33%
Education	High school or below	253	37%
	College	144	21%
	Undergraduate	232	34%
	Graduate or above	62	9%
Monthly income (RMB)	≤3000	232	34%
	3000–5000	182	26%
	5000–8000	153	22%
	≥8000	124	18%
Employment	Government civil servants	38	6%
	Business	191	28%
	Doctors, teachers, and personnel of public institution	104	15%
	Other	358	52%

Descriptive statistics of the independent variables, mediating variables, and dependent variable in this paper are shown in Table 6. Using a Likert scale from 1 (strongly disagree) to 5 (strongly agree), all means are above 3 except for the dependent variable, purchasing behavior.

### 3.5. Model

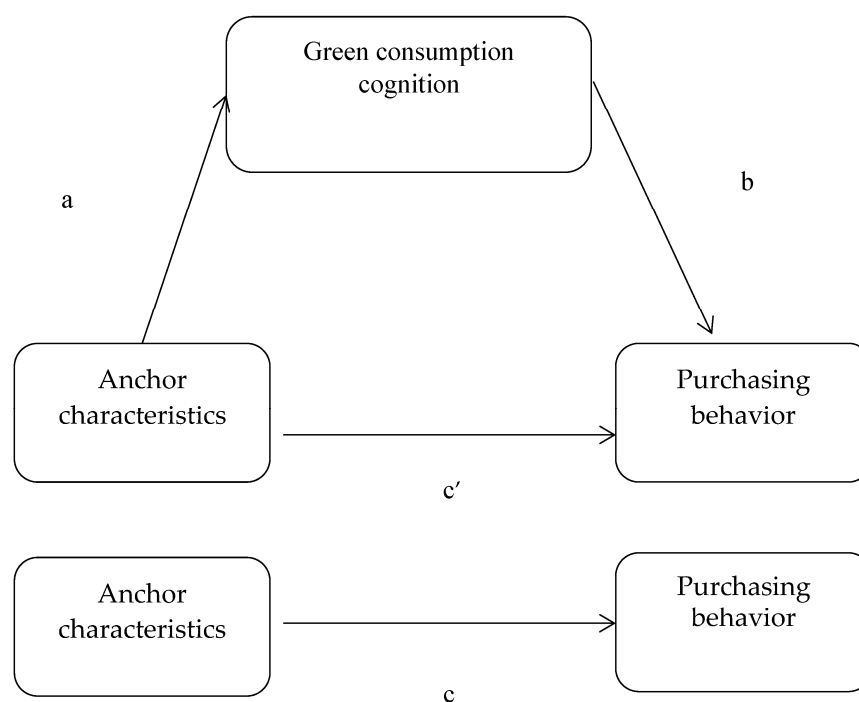
A difference test analysis was first conducted to explore the differences between the variables of anchor characteristics of agricultural products, green consumption cognition, and purchasing behavior at different levels of general information. Second, the impact of anchor characteristics of agricultural products on consumers' purchasing behavior, the impact of anchor characteristics of agricultural products on green consumption cognition, and the impact of green consumption cognition on consumers' purchasing behavior were analyzed to verify the research hypotheses H1, H2, H3, H4, H4a, and H4b. Furthermore, this lays a foundation for further analysis of intermediary effects. Finally, the bootstrap method was used to conduct mediation effect analysis to (1) evaluate the relationship

among anchor characteristics of agricultural products, green consumption cognition, and purchasing behavior, (2) explain the role of green consumption cognition in the influence of three variables of anchor characteristics of agricultural products on purchasing behavior; and (3) verify the research hypotheses H5, H6, and H7. Among them, the anchor characteristics of agricultural products are the independent variables, green consumption cognition is the mediating variable, and purchasing behavior is the dependent variable. The Influence path of the intermediary effect is shown in Figure 2, where  $a$  is the effect of anchor characteristics of agricultural products on green consumption cognition,  $b$  is the effect of green consumption cognition on purchasing behavior, and  $a \times b$  is the indirect effect of anchor characteristics of agricultural products on purchasing behavior. The direct effect of anchor characteristics of agricultural products on purchasing behavior is denoted by  $c'$ , and  $c$  is the total effect of anchor characteristics of agricultural products on purchasing behavior.

**Table 6.** Descriptive statistical analysis of each dimension of each variable.

Variable	Dimension	Mean	Std
Independent	Influence of anchors	3.323	0.600
	Sales promotion of anchors	3.214	0.634
	Interactive entertainment of anchors	3.379	0.593
Mediating	Environmental problem perception	3.492	0.655
	Green consumption awareness	3.711	0.710
	Green consumption cognition	3.574	0.619
Dependent	Purchasing behavior	2.574	0.834

Using a Likert scale from 1 (strongly disagree) to 5 (strongly agree).



**Figure 2.** Path map of mediating effects.  $a$  is the effect of anchor characteristics of agricultural products on green consumption cognition,  $b$  is the effect of green consumption cognition on purchasing behavior, and  $a \times b$  is the indirect effect of anchor characteristics of agricultural products on purchasing behavior. The direct effect of anchor characteristics of agricultural products on purchasing behavior is denoted by  $c'$ , and  $c$  is the total effect of anchor characteristics of agricultural products on purchasing behavior.

## 4. Results

### 4.1. Difference Test Analysis

Differences in agricultural product anchor characteristics, green consumption cognition, and purchasing behavior at different levels of general data were considered. There were no differences for any dimension by gender. A one-way ANOVA showed only one difference by education level categories for green consumption awareness (0.001). Those with a high school education level or lower had a lower level of awareness (3.51) than those older (3.70) ( $p = 0.001$ ). A one-way ANOVA shows differences by age category (Table 7). There are differences for anchor influence, sales promotion, and interactive entertainment, and environmental problem perception and green consumption awareness. Anchor influence and sales promotion for those under the age of 25 are smaller than for those older. In terms of interactive entertainment, those under the age of 25 are smaller than those aged 25–35. For environmental problem perception and green consumption awareness, those less than 25 have lower means than others. There are no age category differences in purchase intention.

**Table 7.** Analysis of different ages in each dimension.

Dimension	Age	Mean	Std	F	<i>p</i>	Multiple Comparisons
Influence of anchors	Under 25	2.900	0.838	12.751	<0.001	1 < (2, 3, 4)
	25–35	3.362	0.584			
	35–45	3.346	0.563			
	Above 45	3.392	0.519			
Sales promotion of anchors	Under 25	2.883	0.753	7.158	<0.001	1 < (2, 3, 4)
	25–35	3.291	0.703			
	35–45	3.252	0.599			
	Above 45	3.214	0.552			
Interactive entertainment of anchors	Under 25	3.131	0.824	5.065	0.002	1 < 2
	25–35	3.466	0.613			
	35–45	3.373	0.585			
	Above 45	3.395	0.486			
Environmental problem perception	Under 25	3.049	0.978	11.609	<0.001	1 < (2, 3, 4)
	25–35	3.554	0.611			
	35–45	3.513	0.608			
	Above 45	3.551	0.569			
Green consumption awareness	Under 25	3.343	0.984	8.084	<0.001	1 < (2, 3, 4)
	25–35	3.848	0.754			
	35–45	3.730	0.665			
	Above 45	3.702	0.591			
Purchasing behavior	Under 25	2.562	0.950	0.343	0.794	/
	25–35	2.529	0.882			
	35–45	2.613	0.825			
	Above 45	2.567	0.775			

Notes: there are 65, 158, 238, and 230 in the age categories of <25, 25–35, 35–45, and >45, respectively. For multiple comparisons, 1 is under 25, 2 is 25–35, 3 is 35–45, and 4 is above 45. Uses a Likert scale from 1 (strongly disagree) to 5 (strongly agree).

There are no differences between groups categorized by income in anchor influence, sales promotion, and interactive entertainment, but there are differences in environmental problem perception, green consumption awareness, and purchasing behavior (Table 8). The lowest income group (<RMB 3000) has a lower environmental problem perception than those with income above RMB 5000. Those earning less than RMB 5000 have a lower level of green consumption awareness than those earning more, and awareness increases with income. Finally, each group individually has a lower purchasing behavior than those earning between RMB 5000 and RMB 8000.



**Table 8.** Analysis of different income level in each dimension.

Dimension	Income (RMB)	Mean	Std	F	p	Multiple Comparison
Influence of anchors	3000	3.248	0.652	2.533	0.056	
	3000–5000	3.313	0.524			
	5000–8000	3.381	0.534			
	8000	3.407	0.665			
Sales promotion of anchors	3000	3.182	0.607	1.271	0.283	
	3000–5000	3.201	0.600			
	5000–8000	3.301	0.583			
	8000	3.184	0.775			
Interactive entertainment of anchors	3000	3.331	0.625	0.819	0.484	
	3000–5000	3.391	0.547			
	5000–8000	3.414	0.517			
	8000	3.409	0.679			
Environmental problem perception	3000	3.379	0.696	4.353	0.005	1 < (3, 4)
	3000–5000	3.492	0.540			
	5000–8000	3.565	0.622			
	8000	3.611	0.738			
Green consumption awareness	3000	3.504	0.722	23.221	<0.001	(1, 2) < 3 < 4
	3000–5000	3.634	0.601			
	5000–8000	3.791	0.642			
	8000	4.113	0.741			
Purchasing behavior	3000	2.547	0.880	7.188	<0.001	(1, 2, 4) < 3
	3000–5000	2.508	0.786			
	5000–8000	2.830	0.803			
	8000	2.403	0.788			

Notes: there are 232, 182, 153, and 124 in the income categories of < RMB 3000, 3000–5000, 5000–8000, and >8000, respectively. For multiple comparisons, 1 ≤ RMB 3000, 2 is RMB 3000–5000, 3 is RMB 5000–8000, and 4 is ≥RMB 8000. Uses a Likert scale from 1 (strongly disagree) to 5 (strongly agree).

There are differences in noted influence and sales promotion of anchors, environmental problem perception, and purchasing behavior by profession category (Table 9). The average for anchor influence among government civil servants is smaller than that of all others except business personnel. In terms of sales promotion, the average response of businesspersons is less than that of personnel of public institution. The mean perception about environmental problems among government civil servants is lower than for each other individual employment category.

**Table 9.** Analysis of different job in each dimension.

Dimension	Job	Mean	Std	F	p	Multiple Comparisons
Influence of anchors	Government	3.086	1.144	3.011	0.030	1 < (3, 4)
	Business	3.283	0.565			
	Public institution	3.325	0.556			
	Other	3.369	0.540			
Sales promotion of anchors	Government	3.126	0.977	4.370	0.005	2 < 3
	Business	3.086	0.564			
	Public institution	3.304	0.570			
	Other	3.265	0.632			
Interactive entertainment of anchors	Government	3.211	1.051	1.621	0.183	
	Business	3.343	0.504			
	Public institution	3.406	0.547			
	Other	3.408	0.583			

Table 9. Cont.

Dimension	Job	Mean	Std	F	p	Multiple Comparisons
Environmental problem perception	Government	3.205	1.050	3.075	0.027	1 < (2, 3, 4)
	Business	3.555	0.570			
	Public institution	3.473	0.634			
	Other	3.494	0.644			
Green consumption awareness	Government	3.535	1.120	2.362	0.070	
	Business	3.805	0.670			
	Public institution	3.744	0.638			
	Other	3.670	0.692			
Purchasing behavior	Government	2.763	1.107	3.626	0.013	(2, 4) < 3
	Business	2.524	0.812			
	Public institution	2.784	0.902			
	Other	2.520	0.781			

Notes: there are 38, 191, 104, and 358 in the profession categories of government civil servant, businessperson, public institution personnel, and other, respectively. Examples of personnel of public institutions include doctors and teachers; 1 is government civil servants, 2 is businesspersons, 3 is personnel of public institutions, and 4 is other. Uses a Likert scale from 1 (strongly disagree) to 5 (strongly agree).

#### 4.2. Hypothesis Test Results

This paper studies influence of the agricultural products anchor characteristics on consumers' purchasing behavior. The agricultural product anchor characteristics considered include influence, sales promotion, and interactive entertainment. The mediating variable in this paper is green consumption cognition. In the stepwise regression analysis test, gender, age, education, income level, and job were included in the model as control variables.

##### 4.2.1. Correlation Analysis

The variables used for correlation analysis in this paper are all approximately normal continuous random variables. We used Pearson correlation analysis to study the correlation between variables. All variables were positively correlated, and none had a correlation greater than 0.64, indicating a lack of multicollinearity (Table 10).

Table 10. Correlation analysis.

Dimension	Purchasing Behavior	Influence	Sales Promotion	Interactive Entertainment	Environ. Problem Perception	Green Consumption Awareness
Purchasing behavior	1					
Influence	0.278 ***	1				
Sales promotion	0.325 ***	0.584 ***	1			
Interactive entertainment	0.389 ***	0.623 ***	0.598 ***	1		
Environ. problem perception	0.231 ***	0.545 ***	0.452 ***	0.633 ***	1	
Green consumption awareness	0.205 ***	0.494 ***	0.399 ***	0.554 ***	0.663 ***	1

Notes: All correlations are significant (\*\*\*)  $p < 0.01$ .

##### 4.2.2. Regression Analysis of Agricultural Products Anchors Characteristics' on Purchasing Behavior

Purchasing behavior was estimated as a function of the three dimensions of agricultural product anchors' characteristics. Model 1 includes only control variables (Table 11). Model 2 includes influence that has a positive impact on purchasing. Model 3 adds the sales promotion variable, and it and anchor characteristics have positive impacts. Model 4 is the simultaneous inclusion of three independent variable dimensions into the model. Adding the interactive entertainment of anchors' interactive entertainment results in an insignificant effect of anchor influence. This supports that the anchor's ability to increase so-

cial interaction and provided and facilitate quick responses to questions and entertainment value are more influential than recognition and perceived professionalism of the anchor. No control variables are significant in most models with two minor exceptions in Model 4.

**Table 11.** Regression analysis result of the agricultural products anchors' characteristics on purchasing behavior.

Dependent Variable		Purchasing Behavior							
Model		M1		M2		M3		M4	
Variable		B	t	B	t	B	T	B	T
Control variables									
Gender		−0.059	−1.540	−0.067	−1.817	−0.074	−2.048	−0.072 *	−2.04
Age		0.022	0.566	−0.027	−0.701	−0.017	−0.448	−0.004	−0.102
Education		−0.018	−0.354	−0.035	−0.734	−0.023	−0.503	−0.011	−0.241
Income		0.004	0.086	−0.027	−0.592	−0.028	−0.620	−0.034	−0.765
Job		−0.051	−1.280	−0.088	−2.287	−0.100	−2.652	−0.096 **	−2.623
Independent variables									
Influence				0.299 ***	7.959	0.150 **	3.340	0.024	0.493
Sales promotion						0.253 ***	5.744	0.149 ***	3.228
Interactive entertainment								0.296 ***	6.184
R <sup>2</sup>		0.006		0.090		0.132		0.178	
Adj. R <sup>2</sup>		−0.002		0.082		0.123		0.168	
F		0.791		11.277 ***		14.831 ***		18.466 ***	

Notes: \*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ .

#### 4.2.3. Regression Analysis of the Agricultural Products Anchors' Characteristics on Green Consumption Cognition

Environmental problem perception was estimated as a function of the three independent anchor variables. Model 1 includes only control variables and shows that environmental problem perception increases with age and income (Table 12). Model 2 introduces the influence of anchors, which positively affects perception. Model 3 introduces anchor sales promotion, which is also positively related. Model 4 adds interactive entertainment. Both influence and interactive entertainment have a positive impact, and sales promotion is no longer significant. That is, effect of sales promotions used by the anchor become negligible in influence on perceptions of environmental problems when the responsiveness of the anchor and audience to questions and other entertainment factors is considered.

**Table 12.** Regression analysis results of the agricultural product anchors' characteristics on environmental problem perception.

Dependent Variable		Environmental Problem Perception							
Model		M1		M2		M3		M4	
Variable		β	T	B	t	β	t	β	T
Control variable									
Gender		0.037	0.976	0.023	0.723	0.018	0.556	0.021	0.734
Age		0.144 ***	3.73	0.057	1.717	0.066 *	2.007	0.086 **	2.906
Education		0.015	0.302	−0.016	−0.386	−0.006	−0.158	0.013	0.364
Income		0.145 **	3.073	0.089 *	2.213	0.089 *	2.246	0.080 *	2.222
Job		0.044	1.116	−0.022	−0.647	−0.032	−0.961	−0.026	−0.862
Independent variable (anchors)									
Influence				0.528 ***	16.15	0.404 ***	10.307	0.203 ***	5.172
Sales promotion						0.212 ***	5.487	0.045	1.200
Interactive entertainment								0.472 ***	12.094
R <sup>2</sup>		0.043		0.307		0.337		0.454	
Adj. R <sup>2</sup>		0.036		0.301		0.330		0.447	
F		6.212 ***		50.609 ***		49.526 ***		70.836 ***	

Notes: \*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ .

Green consumption awareness is next regressed on anchor influence variables. The effect is the same as with environmental problem perception (Table 13).

**Table 13.** Regression analysis result of the agricultural product anchors' characteristics on green consumption awareness.

Dependent Variable	Green Consumption Awareness							
	M1		M2		M3		M4	
	B	T	B	T	B	T	$\beta$	T
Control variable								
Gender	0.072 *	1.98	0.060	1.882	0.055	1.753	0.058 *	1.97
Age	0.070	1.878	−0.007	−0.213	0.000	0.004	0.018	0.570
Education	0.067	1.428	0.040	0.966	0.048	1.183	0.065	1.697
Income	0.269 ***	5.861	0.219 ***	5.428	0.218 ***	5.500	0.211 ***	5.666
Job	0.031	0.820	−0.027	−0.812	−0.036	−1.083	−0.031	−0.996
Independent variable								
Influence			0.471 ***	14.429	0.364 ***	9.243	0.195 ***	4.800
Sales promotion					0.183 ***	4.728	0.043	1.116
Interactive entertainment							0.395 ***	9.788
R <sup>2</sup>	0.101		0.311		0.332		0.415	
Adj. R <sup>2</sup>	0.094		0.304		0.326		0.408	
F	15.332 ***		51.338 ***		48.572 ***		60.374 ***	

Notes: \*  $p < 0.10$ , \*\*\*  $p < 0.01$ .

#### 4.2.4. Regression Analysis of Green Consumption Cognition on Purchasing Behavior

Purchasing behavior was regressed on green consumption cognition variables. Environmental problem perception has a positive impact on purchasing behavior (Model 2, Table 14). In Model 3, green consumption awareness is added as an independent variable, and both environmental problem perception and green consumption awareness have positive impacts. Control variables are not significant.

**Table 14.** Regression analysis result of green consumption cognition on purchasing behavior.

Dependent Variable	Purchasing Behavior					
	M1		M2		M3	
	$\beta$	t	$\beta$	t	B	T
Control variable						
Gender	−0.059	−1.540	−0.068	−1.822	−0.074 *	−1.98
Age	0.022	0.566	−0.013	−0.327	−0.010	−0.262
Education	−0.018	−0.354	−0.021	−0.438	−0.028	−0.581
Income	0.004	0.086	−0.031	−0.659	−0.052	−1.086
Job	−0.051	−1.280	−0.061	−1.588	−0.062	−1.604
Independent variable						
Environmental problem perception			0.243 ***	6.406	0.167 **	3.332
Green consumption awareness					0.119 *	2.304
R <sup>2</sup>	0.006		0.062		0.069	
Adj. R <sup>2</sup>	−0.002		0.054		0.060	
F	0.791		7.536 ***		7.259 ***	

Notes: \*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ .

#### 4.3. Mediating Effect Test

A mediating effect test was run to determine if a third variable, green consumption cognition, plays an indirect role in the influence of the independent anchor variables (influence, sales promotion, and interactive entertainment) on the dependent variable (purchasing behavior). Stepwise regression and the bootstrap technique are used.

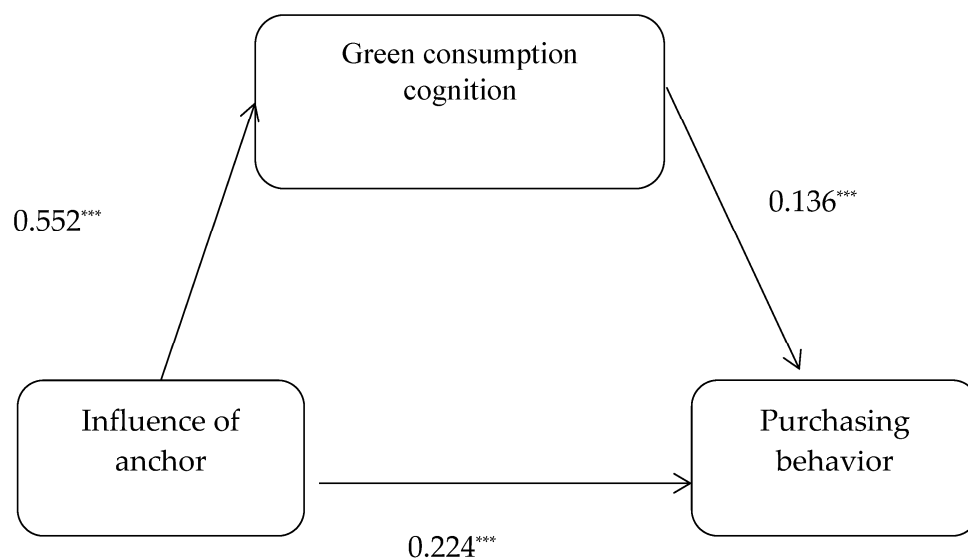
#### 4.3.1. The Mediating Role of Green Consumption Cognition in the Relationship between Influence of Agricultural Product Anchors and Purchasing Behavior

The mediating effect test involves three estimations. Model 1 is the regression of influence on purchasing behavior (Table 15). Model 2 is the regression of influence on green consumption cognition, indicating that influence has a positive impact on consumption cognition. Model 3 includes the influence of the anchor and green consumption cognition as independent variables. As both are significant, it is concluded that green consumption cognition has a mediating effect (Figure 3). Both the total and direct effects of the model are significant (Table 16). The indirect effect of green consumption cognition in the model is significant and accounts for 25.12%.

**Table 15.** Stepwise regression analysis results of influence of anchor, green consumption cognition, and purchasing behavior.

Model	M1		M2		M3	
Dependent Variable	Purchasing Behavior		Green Consumption Cognition		Purchasing Behavior	
Variable	B	t	B	t	$\beta$	t
Gender	−0.067 *	−1.817	0.041	1.334	−0.073 **	−1.978
Age	−0.027	−0.701	0.035	1.083	−0.032	−0.828
Education	−0.035	−0.734	0.007	0.166	−0.036	−0.757
Income	−0.027	−0.592	0.153 ***	3.936	−0.048	−1.036
Job	−0.088 **	−2.287	−0.026	−0.804	−0.084 **	−2.207
Influence of anchor	0.299 ***	7.959	0.552 ***	17.513	0.224 ***	4.981
Green consumption cognition					0.136 ***	3.003
R <sup>2</sup>	0.300		0.597		0.319	
Adj. R <sup>2</sup>	0.090		0.357		0.102	
F	11.277 ***		63.238 ***		11.068 ***	

Notes: \*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ .



**Figure 3.** Impact path map of influence of anchor, green consumption cognition, and purchasing behavior. Note: \*\*\* indicates  $p < 0.01$ .



**Table 16.** Mediating effect test result of green consumption cognition between influence of agricultural product anchors and purchasing behavior.

Effect	Effect Value	SE	t	LLCI	ULCI	Effect Ratio
Total	0.415	0.052	7.959 ***	0.313	0.517	
Direct	0.311	0.062	4.981 ***	0.188	0.433	74.88%
Indirect	0.104	BootSE 0.042		BootLLCI 0.019	BootULCI 0.185	25.12%

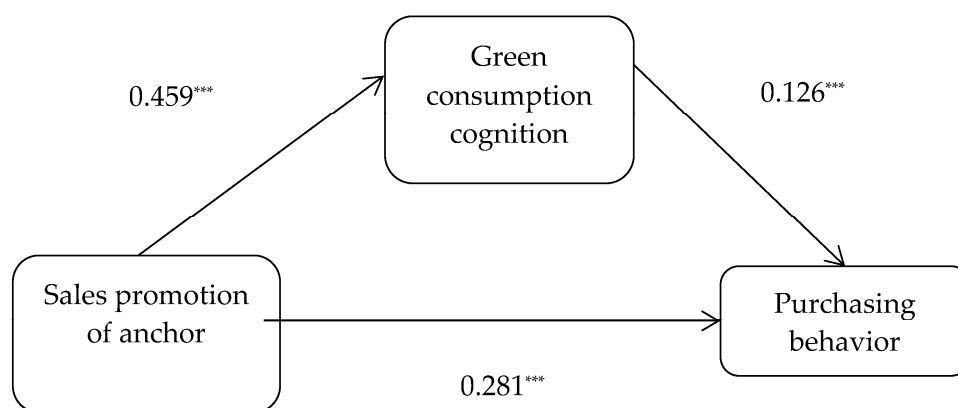
Notes: \*\*\*  $p < 0.01$ .

#### 4.3.2. The Mediating Role of Green Consumption Cognition in the Relationship between Sales Promotion of Agricultural Product Anchors and Purchasing Behavior

The mediating effect of green consumption cognition in the influence of sales promotion on purchasing behavior was tested. As each of the three steps shows significance in both independent variables, we conclude that green consumption cognition plays a mediating role in the influence of sales promotion on purchasing behavior (Table 17, Figure 4). Both total and direct effects of the model were significant (Table 18). The total effect value was 0.445, and the direct effect value was 0.369. The indirect effect of green consumption cognition in the model is significant and accounts for 17.08%.

**Table 17.** Stepwise regression analysis results of sales promotion of anchor, green consumption cognition, and purchasing behavior.

Model	M1		M2		M3	
Dependent Variable	Purchasing Behavior		Green Consumption Cognition		Purchasing Behavior	
Variable	$\beta$	t	B	t	B	t
Gender	−0.074 **	−2.025	0.036	1.099	−0.078 **	−2.161
Age	0.003	0.082	0.100 ***	2.949	−0.010	−0.254
Education	−0.014	−0.294	0.044	1.035	−0.019	−0.414
Income	−0.018	−0.390	0.182 ***	4.410	−0.041	−0.886
Job	−0.091 **	−2.417	−0.013	−0.366	−0.090 **	−2.390
Anchor sales promotion	0.338 ***	9.320	0.459 ***	13.942	0.281 ***	5.426
Green consumption cognition					0.126 ***	6.860
R <sup>2</sup>	0.343		0.524		0.360	
Adj. R <sup>2</sup>	0.118		0.275		0.129	
F	15.218 ***		43.142 ***		14.484 ***	

Notes: \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ .**Figure 4.** Impact path map of sales promotion of anchor, green consumption cognition, and purchasing behavior. Note: \*\*\* indicates  $p < 0.01$ .

**Table 18.** Mediating effect test result of green consumption cognition between sales promotion of agricultural product anchors and purchasing behavior.

Effect	Effect Value	SE	t	LLCI	ULCI	Effect Ratio
Total	0.445	0.048	9.320 ***	0.351	0.539	
Direct	0.369	0.054	4.981 ***	0.264	0.475	82.94%
Indirect	0.076	BootSE 0.030		BootLLCI 0.015	BootULCI 0.135	17.08%

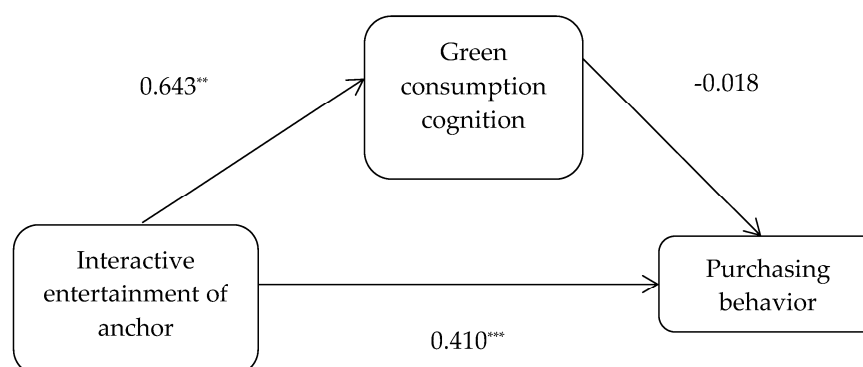
Notes: \*\*\*  $p < 0.01$ .

#### 4.3.3. The Mediating Role of Green Consumption Cognition in the Relationship between Interactive Entertainment of Agricultural Product Anchors and Purchasing Behavior

The mediating effect of green consumption cognition in the influence of interactive entertainment on purchasing behavior was next tested. The standardized regression coefficient of interactive entertainment on purchasing behavior in Model 1 is significant (Table 19). In Model 2, the standardized regression coefficient of interactive entertainment on green consumption cognition is significant. In Model 3, the standardized regression coefficients of interactive entertainment and green consumption cognition on purchasing behavior are 0.41 and  $-0.018$ , respectively. Green consumption cognition is not significant, indicating that green consumption cognition has no significant influence on purchasing behavior in the regression model (Figure 5). The total and direct effects of the model were significant, but the mediating effect of green consumption cognition is not significant (Table 20).

**Table 19.** Stepwise regression analysis results of interactive entertainment of anchor, green consumption cognition, and purchasing behavior.

Model	M1		M2		M3	
Dependent Variable	Purchasing Behavior		Green Consumption Cognition		Purchasing Behavior	
Variable	$\beta$	t	B	t	$\beta$	t
Gender	$-0.067^*$	$-1.884$	0.044	1.563	$-0.066^*$	$-1.857$
Age	0.004	0.109	0.096 ***	3.350	0.006	0.156
Education	$-0.009$	$-0.198$	0.053	1.457	$-0.008$	$-0.177$
Income	$-0.031$	$-0.686$	0.156 ***	4.439	$-0.028$	$-0.614$
Job	$-0.084^{**}$	$-2.282$	$-0.011$	$-0.369$	$-0.084^{**}$	$-2.285$
Interactive entertainment	0.398 ***	11.301	0.643 ***	23.100	0.410 ***	8.712
Green consumption cognition					$-0.018$	$-0.374$
R <sup>2</sup>	0.403		0.690		0.403	
Adj. R <sup>2</sup>	0.162		0.477		0.162	
F	22.066 ***		103.839 ***		18.910 ***	

Notes: \*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ .**Figure 5.** Impact path map of interactive entertainment of anchor, green consumption cognition, and purchasing behavior. Notes: \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ .

**Table 20.** Mediating effect test result of green consumption cognition between interactive entertainment of agricultural product anchors and purchasing behavior.

Effect	Effect Value	SE	T	LLCI	ULCI
Total	0.560	0.050	11.301 ***	0.463	0.657
Direct	0.576	0.066	8.712 ***	0.446	0.706
Indirect	−0.016	BootSE 0.047		BootLLCI −0.109	BootULCI 0.073

Notes: \*\*\*  $p < 0.01$ .

#### 4.4. Hypotheses

Based on the forementioned analysis, eight hypotheses are supported, and one is not (Table 21). Green consumption cognition has both a direct and mediating effect (through anchor characteristics) on purchase behavior. The exception is that green consumption cognition does not play a mediating role between the anchor characteristic of entertainment and purchase behavior.

**Table 21.** Hypothesis test results.

Hypothesis	Result
H1 Influence of agricultural anchors positively affects purchasing behavior.	Supported
H2 Sales promotion of agricultural anchors positively affects purchasing behavior.	Supported
H3 Interactive entertainment of agricultural anchors positively affects purchasing behavior.	Supported
H4 Green consumption cognition positively affects purchasing behavior.	Supported
H4a Environmental problem perception positively affects purchasing behavior.	Supported
H4b Green consumption awareness positively affects purchasing behavior.	Supported
H5 Green consumption cognition plays a mediating role between the influence of agricultural product anchors and purchasing behavior.	Supported
H6 Green consumption cognition plays a mediating role between the sales promotion of agricultural product anchors and purchasing behavior.	Supported
H7 Green consumption cognition plays a mediating role between the interactive entertainment of agricultural product anchors and purchasing behavior.	Not supported

## 5. Discussion and Conclusions

Based on 691 completed questionnaires, this paper uses SOR theory to analyze the impact of the agricultural products anchor characteristics on consumers' purchasing behavior and the mediating effect of green consumption cognition. We first draw conclusions from the results of this research. Challenges faced associated with live streaming of agricultural products and associated logistics are then discussed. Finally, recommendations stemming from our findings within the context of these challenges are offered for the various stakeholders.

### 5.1. Conclusions

There are three primary conclusions.

1. The influence, sales promotion, and interactive entertainment of agricultural product anchors have a significant positive impact on consumers' purchase behavior during livestream events selling agricultural products, supporting findings from the literature [4,6,17,20]. The degree of influence from high to low is sales promotion, interactive entertainment, and influence. The real-time shopping environment of the online livestreaming room, promotional opportunities offered by the anchor, and the real-time, two-way, and entertaining experience obtained by consumers through interaction with the anchor can stimulate consumers' purchasing behavior.
2. Green consumption cognition has a positive impact on consumers' purchasing behavior. The green consumption awareness and environmental problem perception studied in this paper reflect the rational and perceptual aspects of consumers' green cognition. During the livestream events, agricultural product anchors can stimulate

the perceptual side of consumers' environmental problem perception and increase green consumption awareness, both contributing to increased purchase intentions.

3. Green consumption cognition has a mediating effect on the influence of various dimensions of anchor characteristics on consumers' purchasing behavior. The influence of anchors and their sales promotions both positively affect consumers' purchasing behavior through green consumption cognition; that is, green consumption cognition plays a mediating role. However, the mediating effect of green consumption cognition between interactive entertainment and consumer purchasing behavior is not significant.

This paper clarifies the influence of different dimensions of the anchors' characteristics on consumers' purchasing behavior and introduces green consumption cognition as an intermediary mediating variable. The findings are that the characteristics of anchors have a significant impact on consumers' purchasing behavior, of which the sales promotion is the most important, followed by interactive entertainment, and the influence of anchors is the least. At present, the live streaming of agricultural products and the e-commerce industry are in the early stage of rapid development, and China is fully implementing the rural revitalization strategy. This study adds to the literature investigating influencing factors of the live streaming of agricultural products and can help guide the healthy development of the agricultural products livestreaming industry in China. This manifests in the policy recommendations discussed after discussion of the challenges associated with the current agricultural product livestreaming environment.

## 5.2. Challenges and Recommendations

### 5.2.1. Challenges

Despite the growth and success of live streaming of agricultural products, there are persistent and new challenges discussed throughout the literature that require attention for the long-term health of this market option. Challenges include those associated with resources, operations, and oversight. *Resource challenges* include (1) high entry barriers for farmers and local communities to obtain the necessary network infrastructure, (2) lack of technical competence of local governments and farmers to run livestreaming events, (3) lack of trained and professional anchors to offer high-quality, interesting livestream experiences [15], and (4) inadequate logistics channels and lack of ability to move products to consumers while retaining quality, especially of perishable goods and those requiring cold storage [14], resulting in inconsistent and poor-quality products [15]. *Operational challenges* include (1) lack of market segmentation and livestream targeting resulting in undifferentiated material that can be content and operationally tedious [58] and lost sales opportunities, (2) lack of quality signals for viewers, including low brand awareness [15,58], and (3) inconsistent and sometimes poor after-sales support associated with product quality guarantees and customer service [15,58]. *Oversight challenges* include lack of regulation, surveillance, and standardized requirements for operation, product, and product support. Lack of oversight can result in problems such as those associated with food safety, inappropriate language or actions by anchors, and fraud [15].

### 5.2.2. Recommendations

Given the results of this study and the opportunities and challenges discussed in the literature, recommendations are offered for agricultural product anchors, e-commerce firms, consumers, and the government.

#### Recommendations for Agricultural Product Anchors

Anchors should provide affordable high-quality agricultural products to enhance the consumers' sense of gain and continue a sales promotion strategy. Random rewards and other promotions are widely used in live streaming [44], and this research confirms that this is for good reason. It identifies sales promotion to be the most important factor affecting consumers' purchasing behavior in agriculture live streaming. Additional experiential

research will inform the effective use of promotions for agriculture product live streaming, and, in addition to being responsive to promotions, there is clear evidence from the literature that viewers value complete, accurate, and timely information about products, including their attributes, origins, and uses, and use this information to evaluate products and help guide their decisions [17]. Anchors play an important role in building viewer trust in the products, which can in turn increase purchase intention.

Second, the anchor should work to develop the personal interactive entertainment of the live stream and establish a personal brand. Interactive entertainment ranks second in influencing consumers' purchasing behavior. Anchors should continue to improve their service, enthusiasm, and performance quality, work to create a welcoming and interesting atmosphere, and offer viewers relaxed and pleasant online interactions. Top-level anchors who have built a good brand effect through valued attributes such as personal charm are still scarce. Anchors, particularly those new to the role such as government officials, should seek out training opportunities and pay attention to the program format and personalities of successful anchors to improve the success of those livestreaming sessions they host.

Third, the anchor should consider a focus on the concept of environmental protection and green consumption and work so this focus resonates with consumers. This research finds that environmental problem perception and green consumption awareness positively affect purchase behavior, and both play a mediating role between the influence of anchors and sales promotions and purchasing behavior. Anchors should work to arouse the viewer's inner green consumption cognition by highlighting environmental protection and green consumption, amplifying the effects of their efforts in influence and sales promotions. To effectively do so, they need a high level of awareness of green agriculture and its role in addressing environmental problems.

#### Recommendations for Agricultural Product e-Commerce Companies

First, combined with the characteristics and marketing strategies of agricultural products, e-commerce companies of agricultural products should pay additional attention to the quality and low-price attributes of their products. Firms may consider expanding the scope of their product selection and visit rural areas to identify high-quality green agricultural products, obtain considerable price discounts through first-hand purchases, and provide the resulting benefits to consumers in the livestreaming room. When consumers perceive benefits and trust the knowledge and integrity of the anchors, the frequency and quantity of purchases will naturally increase.

Second, firms should actively innovate livestreaming technology, optimize the operation interface, and strengthen the interactive entertainment in the livestreaming room. Anchors should be enabled to conveniently use various online tools in daily live streaming, actively interact with consumers, and deepen the linkage with consumers through interactive entertainment. With investment, technology or human support can, in real-time, serve to identify frequent questions by viewers and those prompting information or discussion likely to be interesting to viewers so the anchors can further develop their relationships with viewers and keep them entertained.

Third, introduce relevant support policies to extensively cultivate excellent agricultural product anchors. This survey found that nearly 24% of consumers have never seen live streaming of agricultural products, demonstrating that additional promotion of agricultural livestreaming events can exploit this untapped market. Relevant enterprises should actively publicize, promote, and support agricultural product live streaming, and improve the online livestreaming and delivery business of agricultural products.

Fourth, support environmental protection public welfare undertakings and establish a corporate image of green agricultural products. In the daily operation of agricultural products e-commerce enterprises, environmental protection public-welfare undertakings can take the form of practical applications that help spread the concept of green consumption and establish a green brand or firm image. This will also increase consumer awareness. Companies must firmly adhere to the concept of quality first and strictly control all aspects



to ensure a consistently high-quality product to increase the trust of consumers. These behaviors of enterprises will resonate with consumers' green consumption cognition, which will help to increase the sales of agricultural products and achieve the healthy development of live streaming and rural revitalization.

#### Recommendations for Government

The government played and continues to play an important role in the development and growth of agriculture live streaming, and it has been effective in reducing rural poverty. The government should now focus on ensuring the venue continues to offer consistent high-quality, safe products that are offered at reasonable prices to customers. First, the government should consider developing rules that regulate live streaming and subsequent actions including logistics and follow-up service and supervise their implementation [15]. The government can also facilitate development of standards and certifications that designate quality and safety, as well as other food product attributes and production practices. Finally, the government can work to offer livestreaming-anchor-training programs, especially for farmers and government officials, so viewers continue to participate in livestreaming events and purchase products directly from farmers.

#### Recommendations for Consumers

Recommendations have focused on increasing and maintaining livestream viewers. However, viewers must also use caution when participating in livestream events. These events are designed to appeal to viewers' emotions, and this can lead to impulsive buying behavior and sometimes buyer's remorse. Consumers should shop rationally, understanding their real needs and being willing to comparison shop and choose livestreaming rooms with reputable and powerful agricultural product e-commerce enterprises.

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